January 24, 1957

The IRON AGE

The National Metalworking Weekly

Metalworking Spurs Boom on Waterways P.35

Foundries Fight Price Squeeze P.40

How Grit Blasting Checks Case Hardness P.71

Digest of the Week P–2

FOR ACCURACY!

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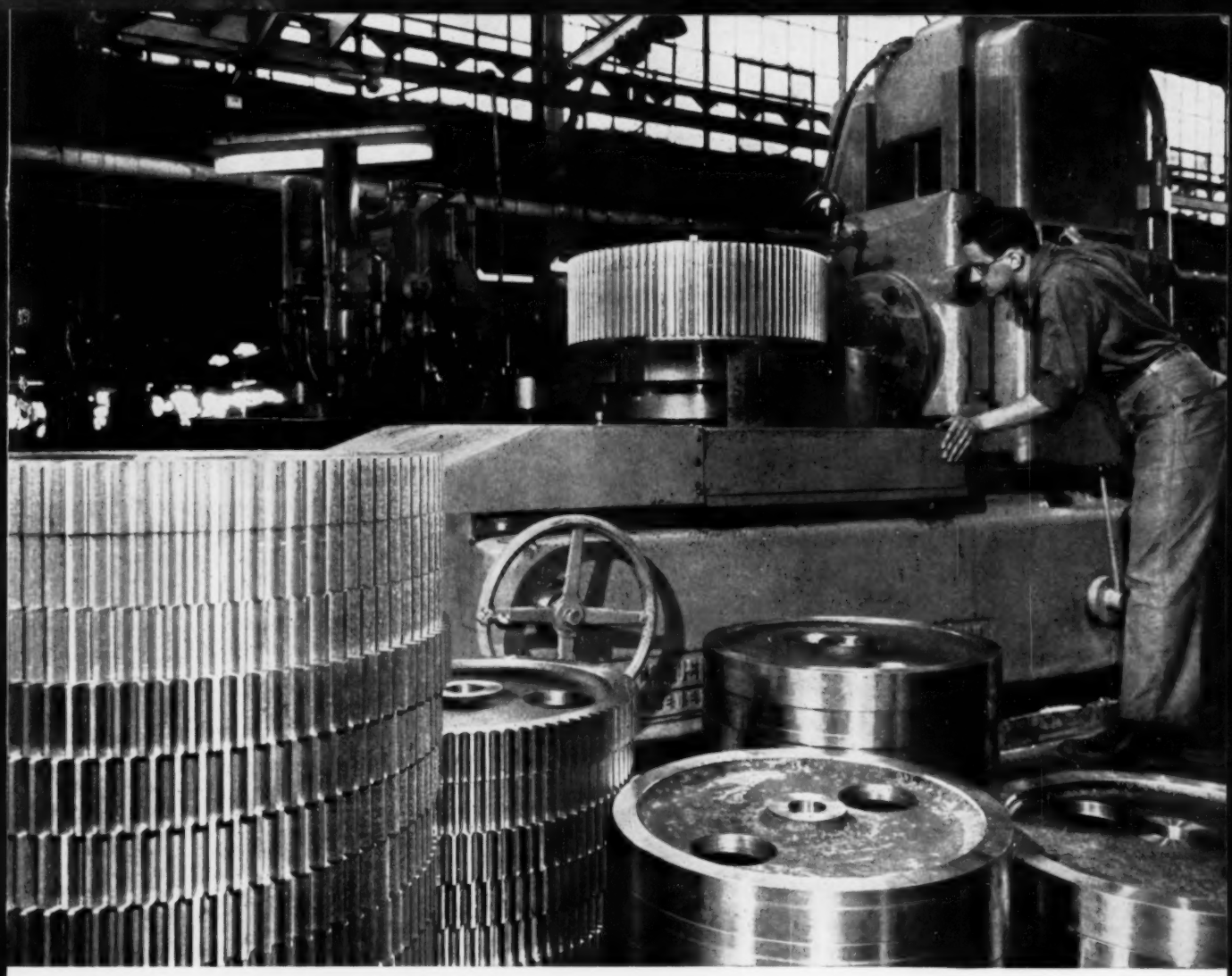

They Will Stand Close Inspection

The young man at the hobbing machine is merely giving his work an appraising look. Detailed inspection will come later, and it is safe to say that the verdict will be favorable. For this is the shop of The Adams Company, Dubuque, Ia., specialists in the art of making good gears.

Each of the gears in the photograph has 86 teeth; is 22 in. in diameter and weighs 153 lb finish-machined. Each is intended for use in heavy-duty excavating equipment. Four gears are machined at one time in the hobber, though you may have to look sharply to detect all four.

The gears are made from Bethlehem circular blanks. These blanks are both forged and rolled by a unique single-step method that insures great strength, uniform density, and regular grain flow. Blanks made by this process can be furnished in a wide variety of sections, and in sizes ranging from 10 to 42 in. OD.

Excellent for heavy-duty gears, Bethlehem blanks also have many other end uses—sheave wheels, crane wheels, flywheels, turbine rotors, pipe flanges, etc. Whether you manufacture gears or something else requiring circular blanks, we'd like the chance to send you full details. A letter, wire, or telephone call will bring the complete story to you promptly.

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BETHLEHEM STEEL

Jan. 24, 1957—Vol. 179, No. 4

The IRON AGE

Digest of the Week in Metalworking

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NEWS DEVELOPMENTS

HOW YOUR BANKER LOOKS AT CREDIT IN 1957 P. 38

You can expect closest possible scrutiny when you ask for a business loan this year. Bankers are faced with tight money, but are also worried about some aspects of business. Your rating will have to be good to borrow this year.

SCRAP MENDS ITS PUBLIC RELATIONS FENCES P. 39

Scrap iron and steel tackles problem of improving relations with the public. Smoke control laws pose some questions for yard operators. Industry looks ahead to another good year in 1957.

MARKET STABILITY AHEAD FOR PLATE AND STRUCTURALS P. 42

Both producers and users should benefit in years ahead as supply and demand come more into balance. Producers are pushing expansion plans amid sureness of continuing good market.

HOW FOUNDRIES FIGHT THE PRICE SQUEEZE P. 40

The wage-price spiral is affecting foundries' net earnings. Prices of castings lag behind increased costs, foundrymen say, but they are willing to absorb the difference

Inland waterway traffic last year established a record of over 100 billion ton-miles. Bargemen feel majority of this business is theirs to keep. One disadvantage of this transport is its relative slowness. But cost advantage is the peg they expect to hang continued prosperity on.

HOW TO FIGHT THE PRODUCTIVITY BATTLE P. 43

General Electric and utility companies hold 100th productivity forum. Purpose is to show new technical developments that will enable industry to double output in 20 years. Key GE specialists outline progress in their fields.

FEATURE ARTICLES

GRIT BLASTING AIDS CARBURIZING QUALITY P. 71

It's tough and often impossible to check hardness on a carburized part that has a complex design. But you can check uniformity by first grit blasting the part. The grit roughens soft areas and leaves hard areas smooth. Since grit blasting is often used to clean the part anyway, cost isn't a factor. The method guards against stop-off deficiencies.

A NEW LOOK AT TEMPER BRITTLENESS P. 73

Both metallurgists and design engineers have at least one uncommon problem in common. They would like to improve the mechanical properties of steels used at critically high stress. But they would like to clinch this objective without wasting alloy or increasing steel costs. Defense needs are pacing progress in this field.

THE HUMAN ELEMENT AND BETTER INSPECTION P. 78

The inspector is the key element in any inspection job — perhaps even more so in magnetic-particle and fluorescent-penetrant checking of metal parts. Undetected tiny flaws could lead to tragic failures in service. Basic good vision and good training help.

ALLOYS BRAZE EASIER IN A VACUUM P. 80

Where oxidation and fluxing problems make brazing difficult, brazing in a vacuum might be the solution. It keeps surfaces clean and reduces the amount of flux needed. One company builds its own vacuum furnace to prove that tricky, highly alloyed metals can be brazed successfully this way.

SMALL PARTS NEED SPECIAL ASSEMBLY AREAS P. 84

The trend toward miniaturization points up the need for controlling conditions in the work area. Special layout and room construction, air conditioning, and rigid work standards all help to cut rejects and improve the product. Here is one plan suitable for small ports mass production, holding tolerances in the millionths.

MARKETS AND PRICES

WAREHOUSES HUNT CAPITAL GOODS ITEMS P. 44

Most products are in good supply. But there is little hope for structurals, plates and products used in expansion. Bars and most flat-rolled products are available. Most alloys and stainless steels are in ample supply. However, the nickel problem continues to shadow the stainless steel picture.

BEHIND GM'S SALES LAG: STYLE OR PRICE? P. 52

Rumors that General Motors Corp. wants fewer sales this year to stave off the trust-busters, is sheer nonsense. Slipping Buick, Olds, and Pontiac sales may be more a matter of consumer resistance to style or price. And it is not likely GM deliberately de-emphasized style changes on 1957 models.

HAWAII IS PROMISING METALS MARKET P. 58

Islanders, spending $425 million a year on imports, want to expand their own manufacturing facilities. Some of the advantages of the area include good living conditions, plentiful power and a skilled labor force.

IKE'S BUDGET FACES TOUGH GOING IN CONGRESS P. 57

Democrats will jump on appropriations request. They will charge that Defense is short-changed. Air Force will be a leader in complaining it didn't receive a fair shake—in spite of increase of $600 million.

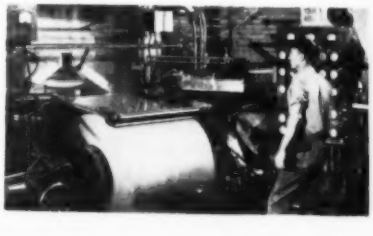
WHAT'S THE REAL PICTURE IN STEEL MARKET? P. 119

Automotive demand may be lagging. But that's only part of the picture. There are still plenty of strong factors in the steel outlook. These include construction, shipbuilding, oil and gas, and freight cars.

NEXT WEEK:

HOW TO GET THE MOST OUT OF ALUMINUM

Aluminum consumption is at the highest peak ever. And demand is expected to increase 10 pct this year. Next week's special report tells why aluminum holds a dominant place among nonferrous metals; where it can be used profitably.



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The ease with which heat exchanger and condenser tubes can be rolled into tube sheets depends, to a certain extent, upon the uniformity of tube wall. One of the controlling factors of wall uniformity in the manufacture of seamless steel tubing is the contour of the piercer point.

Phil Morrison, a piercer point man, is shown at work on one of B&W's seamless tube mills. One of his duties is to examine the piercer point between each tube making operation. By making certain that the point has not been deformed in service—and that takes experience and a practiced eye—he helps to control wall uniformity in the pierced tube. He knows that although hot and cold work after the piercing operation can minimize, it cannot eliminate non-uniformity of wall section.

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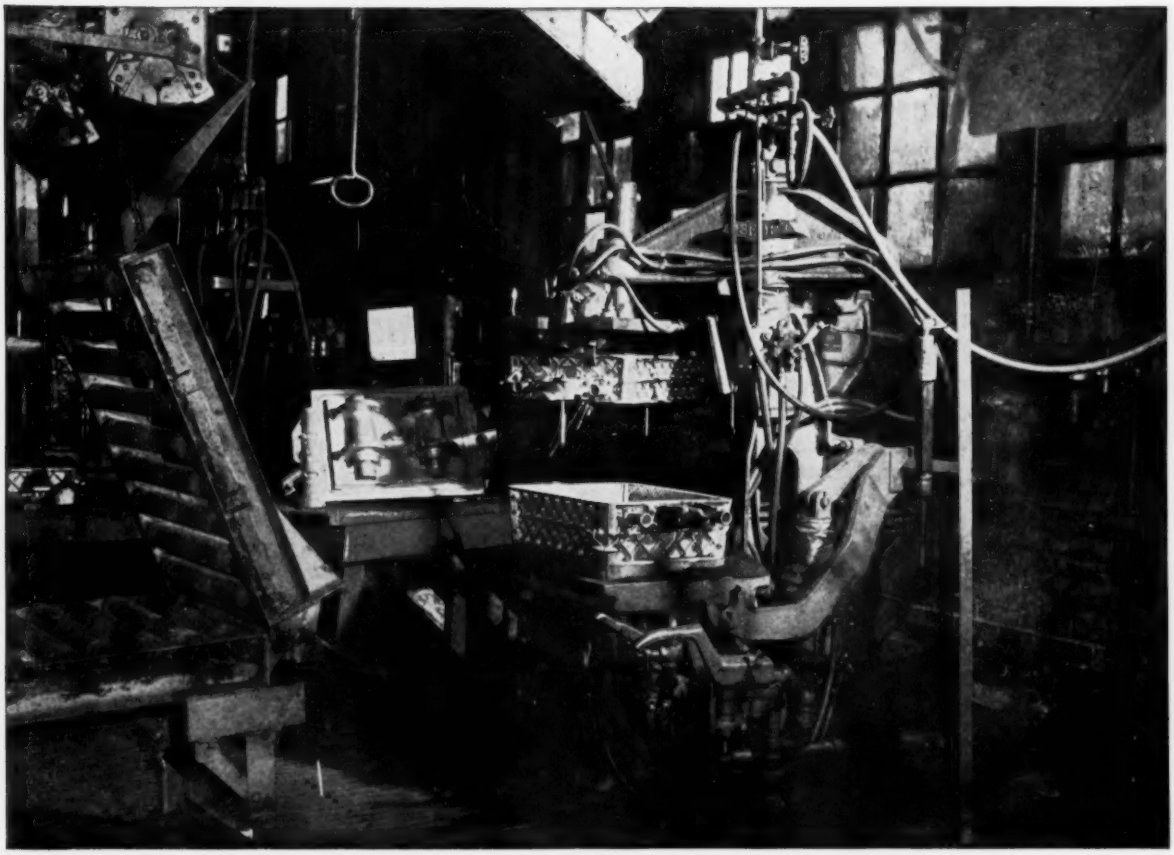

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FOUNDED 1855

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Indexed in the Industrial Arts Index and the Engineering Index.

BPA NBP

EDITORIAL

How High Is Up These Days?

◆ SOME PEOPLE are readying up their storm cellars. But make no mistake about it; they want them plush-lined with hot and cold running water and stocked with Rock Cornish game hens.

Those year-end statements about the rosy future are being tinged with a darker hue by some of the experts. Right now some of the critics are looking towards the steel industry.

It seems we are not going to see a 100 pct operating rate for the next 12 months—and who expected it? It may be that there will be a dip before midnight June 30. And besides, some people don't want as much steel as they ordered a year ago.

Being in need of a needle which will take it either up or down the stock market has latched on to the darker hues being painted for the steel outlook.

If you take a careful temperature of the "cautious" reports you won't find any real dope that you did not know before. All they say is that things can't go on like this forever; that this year some of the steam is out of the engine. Just maybe—we are told—a down-trend will surprise some of those optimists who let go with such sweet music earlier this year.

We were one of those who looked for a good year in steel. Despite all the "inside" information we still think that the steel industry—and the entire metalworking industry—will have a good year; better than last year.

We don't think steel operations will average 100 pct all year but it has more than an even chance to average 88 to 90 pct for the year. While sheets are easier to obtain than a year ago they will be no drug on the market.

We still see a passenger car sales year of from 6.2 to 6.5 million this year with two of the "big three" doing much better than last year. Plans and contracts for new plant and equipment have been made for 1957. Few if any of these projects will be eliminated.

Defense spending will rise this year. Its impact on industry will be greater than it was a year ago.

You may keep your storm cellar in shape. But the chances are excellent that you won't need it for quite a spell.

Tom Campbell

EDITOR-IN-CHIEF

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dear editor: letters from readers

Aerial Surveys

Sir:

I read Mr. Rohan's article in the Nov. 1 issue, and fully agree that photogrammetic methods can be used to advantage in many situations. We have been using this method to determine coal stocks for audit purposes for the past six years, and we were not the first to do so. I doubt if Aerial Survey's work in 1950 was the earliest, as your reporter implies.

However, I question the accuracy of the figures quoted. We find major uncertainties in two factors—first, where is the bottom of the pile? In most of our locations coal is stocked in large piles which are never completely depleted, so that we are not able to determine what settlement may have occurred in the ground since the pile was started. From borings and other observations we know this to be an appreciable factor. Second, how is the density determined? From our experience with coal, which is a relatively homogeneous material, I do not see how the density of a pile of scrap could possibly be determined within the 0.5 of one pct accuracy claimed.

We estimate that our overall accuracy is somewhat better than 5 pct. This is quite satisfactory and we believe that it is comparable to good surveying practice. The same uncertainties exist in any method, of course. *L. V. Jewell, Asst. Div. Engr., The Detroit Edison Co., Detroit.*

Reference to "firsts" in the aerial survey field was to use by the steel industry for iron ore, not coal or other materials. Establishing the bottom of a pile is obviously an arbitrary figure at best but should be carefully worked out based on all available data and company records. We don't believe any aerial surveyor would claim 0.5 pct accuracy on a scrap pile inventory simply because this applies only to homogeneous material (which scrap is not) and is not considered packed.—Ed.

Stamping Handbook?

Sir:

Please send three reprints of the article by Frederick Strasser entitled "When to Convert to Stamping" in the Dec. 20 issue.

I think the entire series of articles by Mr. Strasser is worthy of being considered as material suitable for a small handbook on stamping techniques. *F. K. Jaessing, Development Dept., United States Rubber Co., Fort Wayne.*

Diversification

Sir:

I recently had the pleasure of reading a copy of your magazine as a reference in the office of an agency, the name of which I am not at liberty to use. I was very interested in one article and I would be very appreciative if you could send me a tearsheet or reprint of the article. The article is as follows: "Diversification: Watch The Pit-Falls," Aug. 10, 1956. *J. H. Kennington, Capt., A. F. Reserve., St. Louis, Mo.*

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Steel Spends $1.7 Billion

What the steel industry does about capacity is Page 1 news. Just last week, steel stocks broke on the big board on Monday, slipped further on Tuesday. On Wednesday they steadied; Bethlehem, Crucible, Republic and Youngstown, among others, recovered from the earlier pressure. Significantly, American Iron & Steel Institute had on Tuesday afternoon released data showing that the steel industry planned to spend $1.7 billion on expansion in 1957. To many a Wall Streeter, this was enough to restore confidence shaken by news that Detroit wasn't coming into the steel market as strongly as some steel people had expected.

What steel does is significant to metalworking too. That's why the editors bring you each year a 6-page foldout showing changes in steel capacity by Iron Age steelmaking districts. You'll find it facing p. 48 in this issue. There'll be a few thousand extra copies but they'll probably go quickly. So if you need one it might be wise to write Reader Service right now.

Another "Dollar"

First in production of nonferrous metals, last year's total U. S. aluminum supply topped 2.5 million tons. And on a *volumetric* basis more aluminum is produced than all the other major nonferrous metals combined. On a tonnage basis, only iron and steel exceed it today.

These figures give you some idea of the big role played by aluminum in the metalworking industry. Almost all primary aluminum winds up in one form or another—in metalworking plants.

There's a lot to know about aluminum—its alloys and their fabrication into finished products.

For this reason, the editors have picked aluminum as No. 7 in the "How To Get More For Your Metalworking Dollar" series. This 16-page "dollar" feature will appear next week.

The article will cover the important highlights, beginning with a simple guide to aluminum alloy

ALCOA forges aluminum wheel for a luxury model automobile

selection. How aluminum is treated —and why—is the next major heading. This is followed by some of the more important principles of aluminum forging and casting.

One of aluminum's selling points is its superior machinability. So tips on machining opens the second part of the feature. Joining aluminum is another highlight. And we cover not only welding and brazing but riveting as well.

New Puzzler

You model train enthusiasts will have an advantage on this one. Two freight trains, each 1000 ft long, meet on a single track road. The only available side track is 500 ft long. How can the trains pass with the fewest uncouplings and back ups and downs?

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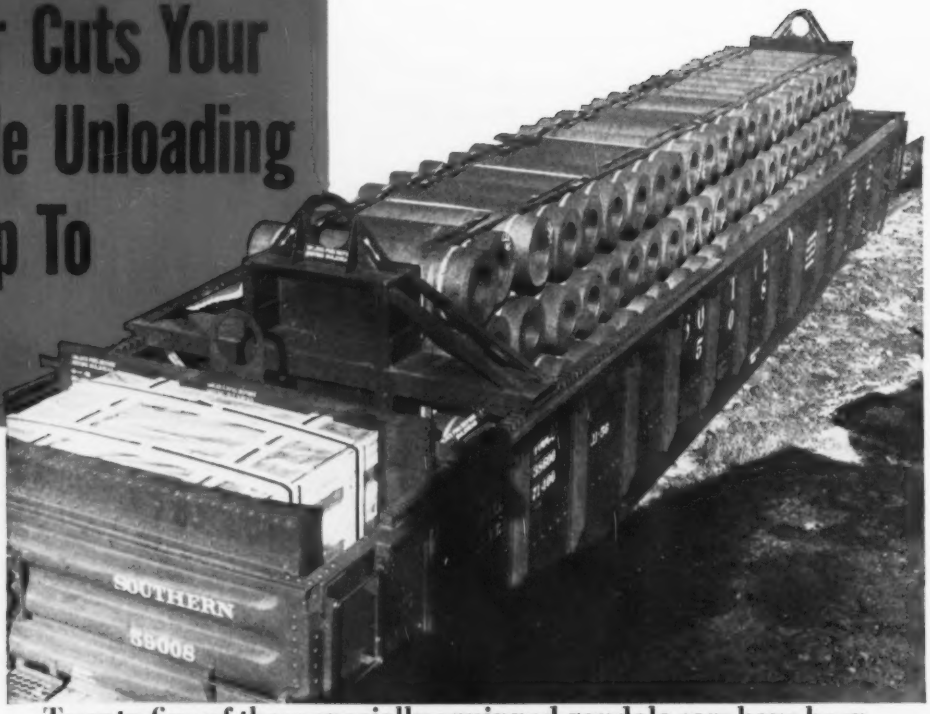
This Car Cuts Your Electrode Unloading Costs Up To 80%



Twenty-five of these specially equipped gondola cars have been placed in service by Southern Railway System to handle graphite electrode shipments from the Great Lakes Carbon Corporation plant in Morganton, N. C.

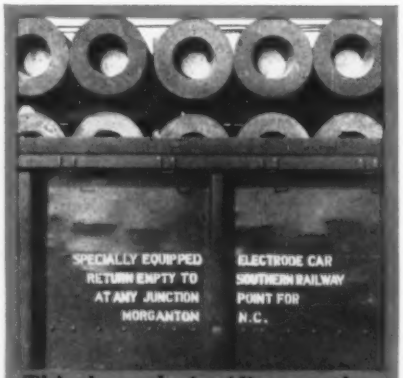
• • •

Exhaustive tests conducted during actual electrode deliveries proved conclusively that the new cars save up to 80% in costs, as compared with other methods.

Three unique devices in the new cars are responsible for these amazing results. An adjustable bulkhead quickly compensates for differences in electrode shipments. At the other end of the car, a self-adjusting bulkhead automatically moves forward to take up any slack that might develop en route. Another movable bulkhead offers safe stowage for the accompanying nipples.

These specially equipped electrode cars effect their savings through substantially reduced labor costs, less crane time and the virtual elimination of dunnage.

We wish to express our appreciation to Southern Railway System for its splendid cooperation in helping us effect these savings for our customers.



This legend signifies another major Great Lakes Carbon Corporation contribution to electric steel progress.

ELECTRODE GLC DIVISION

GREAT LAKES CARBON CORPORATION

18 EAST 48TH STREET, NEW YORK 17, N.Y. • OFFICES IN PRINCIPAL CITIES

dates to remember

JANUARY

Industrial Heating Equipment Assn., Inc.—Annual meeting, Jan. 28-29, The Shoreham Hotel, Washington. Assn. headquarters, 1145 19th St., N.W., Washington, D. C.

Cutting Tool Mfrs. Assn.—Annual meeting, Jan. 29, Detroit Yacht Club, Detroit. Assn. headquarters, 416 Penobscot Bldg., Detroit.

FEBRUARY

American Management Assn.—Marketing conference, Feb. 4-6, Hotel Statler, New York. Assn. headquarters, 1515 Broadway, New York.

EXPOSITIONS

1957 Nuclear Congress—March 11-15, Philadelphia.

American Society for Metals—March 25-29, Los Angeles.

American Foundrymen's Society—May 6-10, Cincinnati.

American Society for Testing Materials—Annual committee week and spring meeting, Feb. 4-8, Benjamin Franklin Hotel, Philadelphia. Society headquarters, 1916 Race St., Philadelphia.

The Society of the Plastics Industry, Inc.—Annual exhibit and conference, Reinforced Plastics Div., Feb. 5-7, Edgewater Beach Hotel, Chicago. Society headquarters, 250 Park Ave., New York.

Malleable Founder's Society—Technical and operating conference, Feb. 7-8 Wade Park Manor, Cleveland. Society headquarters 1800 Union Commerce Bldg., Cleveland.

The Institute of Surplus Dealers—Sixth annual trade show and convention, Feb. 16-19, New York. Society headquarters, 673 Broadway New York.

American Institute of Mining and Metallurgical Engineers—Annual Meeting, Feb. 24-28, Roosevelt and Jung Hotels, New Orleans, La. Society headquarters, 29 W. 39th St., New York.

MARCH

American Machine Tool Distributors' Assn.—Spring meeting, March 6-7, El Mirador Hotel, Palm Springs, Calif. Assn. headquarters, 1900 Arch St., Philadelphia.

Pressed Metal Institute—Technical meeting, March 6-8, Hotel Carter, Cleveland. Society headquarters, 3673 Lee Rd., Cleveland.

How DOUGLAS saved 25,000 manhours!

With SPEED-D-BURR PRECISION BARREL FINISHING*

An Incredible $140,000.00 in Dollar Savings!

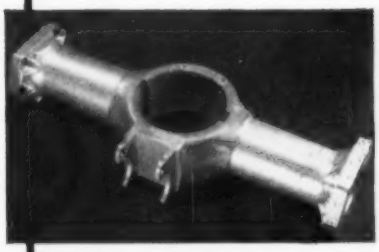
Time consuming handwork, production delays, difficulty in controlling uniformity and high costs in deburring a wide variety of parts in short runs was a problem faced by Douglas Aircraft. Turning to precision barrel finishing as a possible solution, a survey of various types of equipment and sample lot testing of many parts followed. SPEED-D-BURR engineers recommended a 4 unit installation to begin production *(picture above)*. Within a few weeks, savings began to mount, parts were being turned out faster than ever before and close tolerance finish quality was greatly improved on widely diversified parts from a 30" long casting to small washers—all in the same SPEED-D-BURR installation. Time study records indicated that projected manhour savings would reach 25,000 for the year with a dollar savings of $140,000.00 *(more than 10 times the equipment cost)*.

Like to read the whole story? Ask for Speed-D-Burr Folder DA-1...

ALSO WRITE FOR CATALOGS:

- *How to Cut Production Costs 80% or More*
- *The Futurama Series*
- *The Mity-Mite Series*
- *Media and Compounds*
- *Hot Sawdust Barrels*
- *Handling and Separating Equip.*

*As told in Iron Age Magazine — August 2, 1956



ONE SAVINGS EXAMPLE

Part No. 5638557-3

Hand Deburr . . .	$11.25 each
Speed-D-Burr . . .	.50 each
SAVINGS	$10.75 each

This is just one of many parts on which exceptional savings were made using SPEED-D-BURR Precision Barrel Finishing.

Service Is Our Most Important Product... It Does Not Cost... IT PAYS!

SPEED-D-BURR CORPORATION PRECISION BARREL FINISHING DESIGNERS • ENGINEERS MANUFACTURERS

THE WORLD'S MOST COMPLETE LINE OF PRECISION BARREL FINISHING EQUIPMENT & SUPPLIES

SPEED-D-BURR CORPORATION

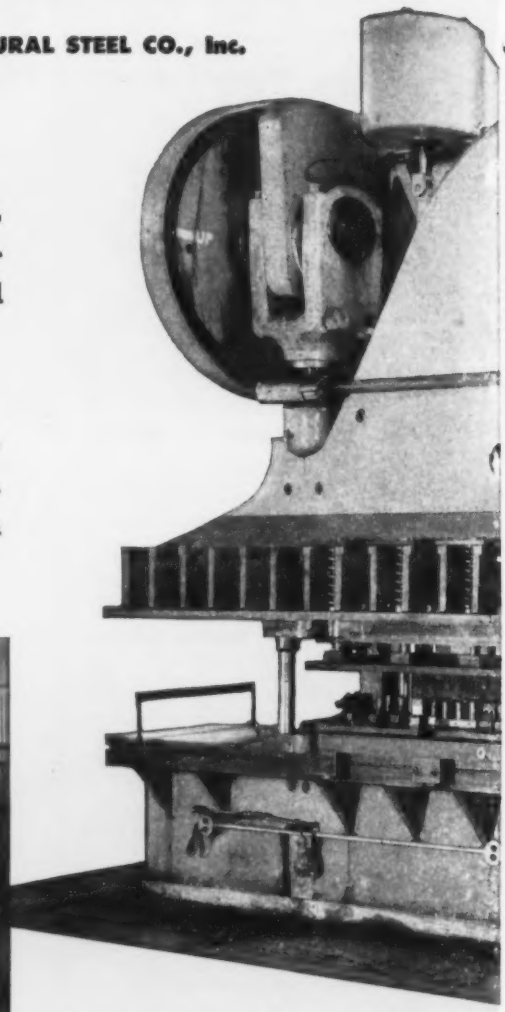
3613 SAN FERNANDO RD., GLENDALE 4, CALIF.

Distributorships available in some key areas . . . to complete our national sales network.

70 minutes cut

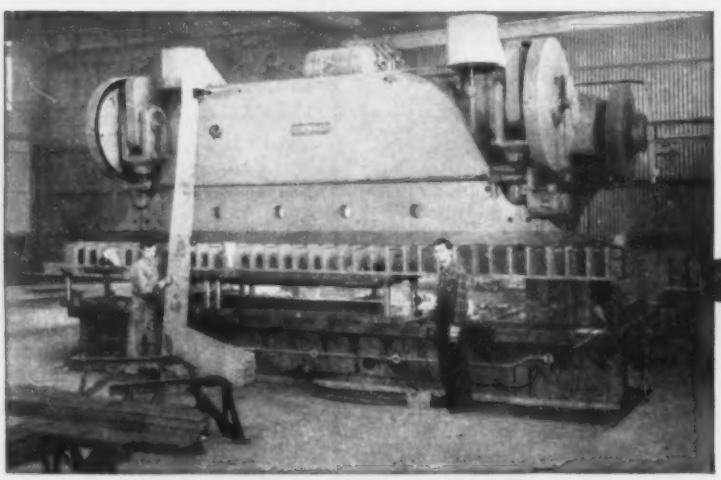
on combined blanking and punching operations!

—**FORT WAYNE STRUCTURAL STEEL CO., Inc.**
Fort Wayne, Ind.



This versatile Cincinnati All-Steel Press Brake, 34 Series x 16′, has revolutionized the production of these long motor truck side rail reinforcements.

Write **Department B** for Catalog B-4R.
We also suggest you check with our Application Engineering Department on the use of a versatile Cincinnati All-Steel Press Brake in your shop.



(A) Blanking floor to floor time 1¼ minutes. Previous time 34 minutes.

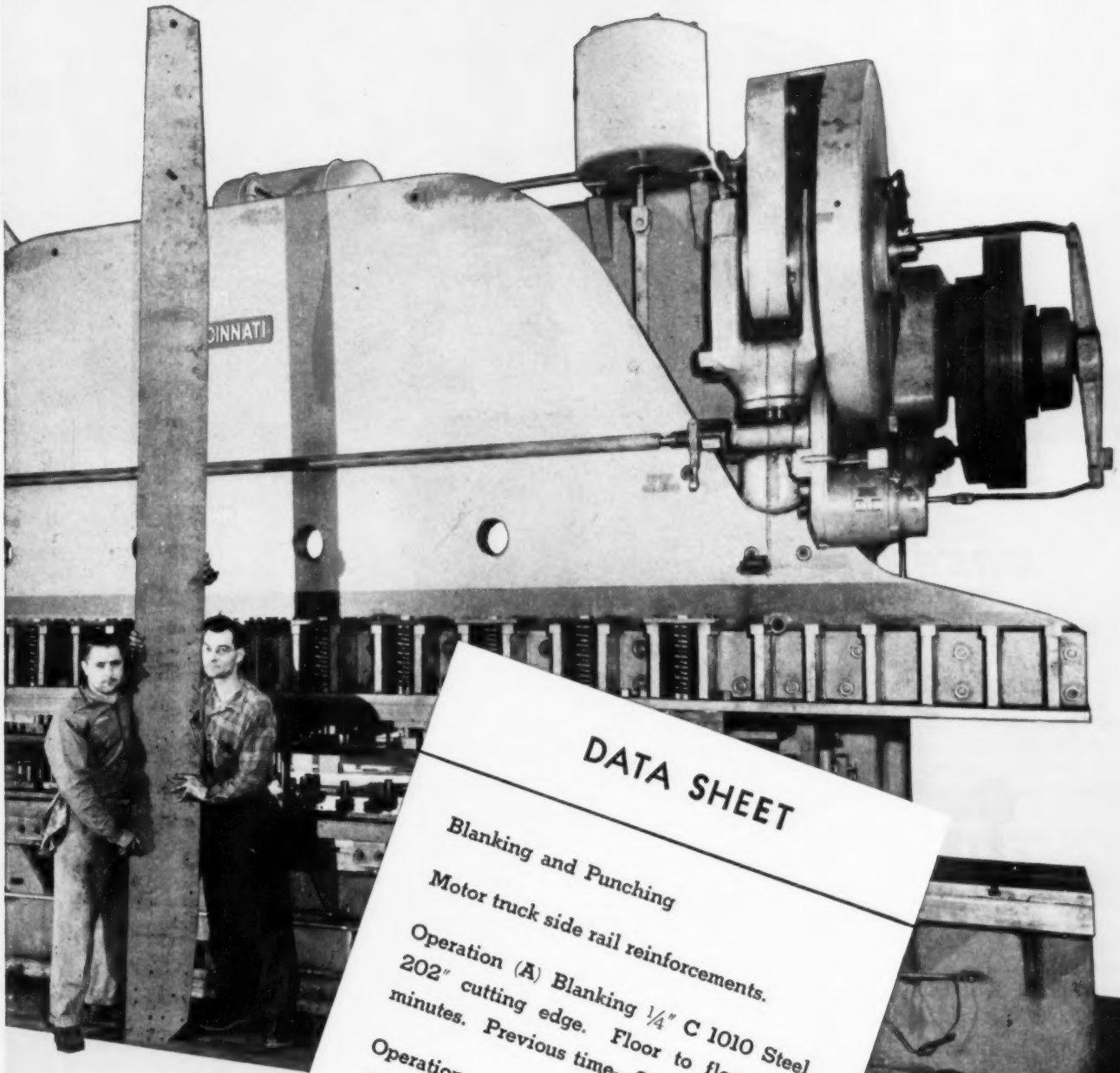
(B) Note Fort Wayne's ingenious punching equipment which reduced punching time from 36 minutes to 1⅗ minutes and took advantage of every versatile Cincinnati feature.

CINCINNATI

THE CINCINNATI SHAPER CO.

CINCINNATI 25, OHIO, U.S.A. SHAPERS • SHEARS • BRAKES

to 2.6 minutes...



DATA SHEET

Blanking and Punching

Motor truck side rail reinforcements.

Operation (A) Blanking ¼" C 1010 Steel 202" cutting edge. Floor to floor—1¼ minutes. Previous time—34 minutes.

Operation (B) Punching 130 holes per stroke. Floor to floor—1⅓ minutes. Previous time—36 minutes.

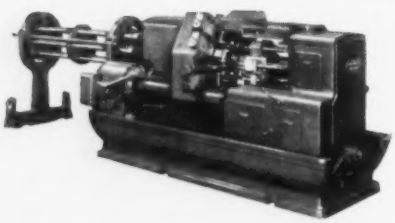
John L. Hayner
President

Photos Courtesy—
FORT WAYNE STRUCTURAL STEEL CO., Inc.
Fort Wayne, Indiana

FROM DIESEL ENGINE TO ICE-CREAM FREEZER PARTS

AUTOMATIC BAR MACHINES

Handle All Types of Jobs



SIX AND FOUR-SPINDLE AUTOMATIC BAR MACHINES

GREENLEE Special Machine Tools

- Multiple-Spindle Drilling and Tapping Machines
- Transfer-Type Processing Machines
- Hydro-Borer Precision Boring Machines

✓ ***Efficiently...***
✓ ***Economically***

Greenlee design permits the handling of a wide variety of operations at various spindle positions . . . makes it easier to split up long operations . . . reduces idling time.

Threading, tapping and reaming can be performed in 3rd, 4th, 5th and 6th positions . . . a special Greenlee advantage. Seven full-length T-slots on the main tool slide will accommodate the tools and attachments needed for a wide range of set-ups. Interchangeable cross-slide tooling and simplified cross-slide camming contribute to greater flexibility and faster set-ups.

Investigate! Ask any owner or operator . . . they'll tell you that Greenlee is one of the most highly respected names in its field.

Write for Catalog No. A-405

GREENLEE
BROS. & CO.

1802 MASON AVE.
ROCKFORD, ILL.

CONTINUOUS THERMAL PROCESSING...

more steel... improved quality!

A significant first in the steel industry has resulted from the recent installation of three new and identical annealing lines, each designed to deliver 20 tons of improved-quality silicon steel per hour.

This continuous annealing operation in a limited area created an unusual problem in control accuracy and reliability. Westinghouse MAGAMP* magnetic amplifier regulators form the heart of the control system . . . make this the first all-magnetic amplifier continuous annealing line. Westinghouse furnished complete electric equipment and furnaces for all three lines.

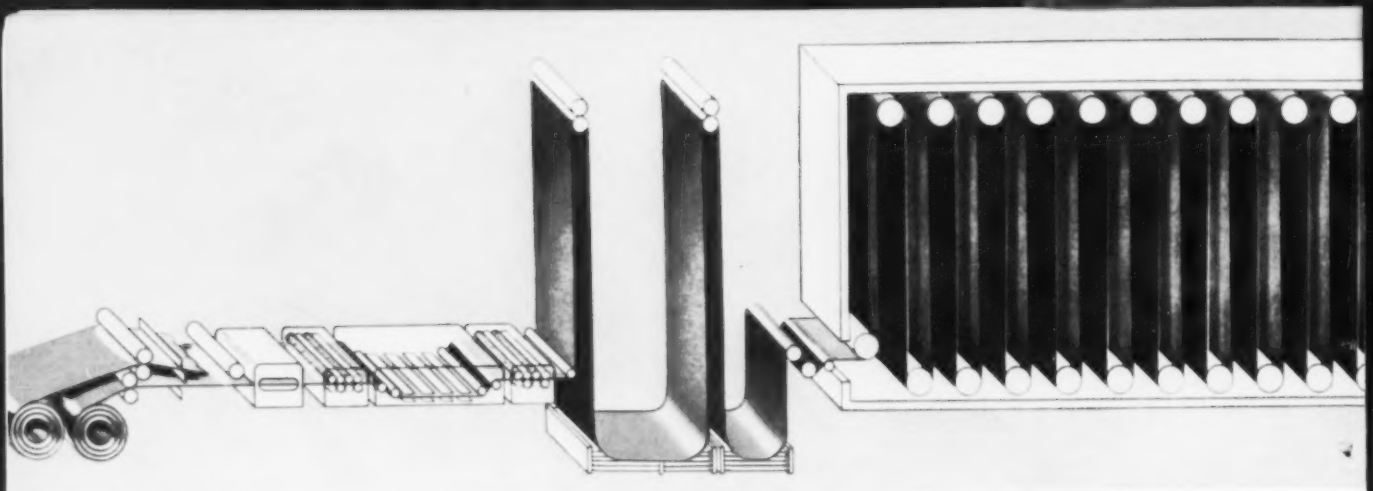
And . . .

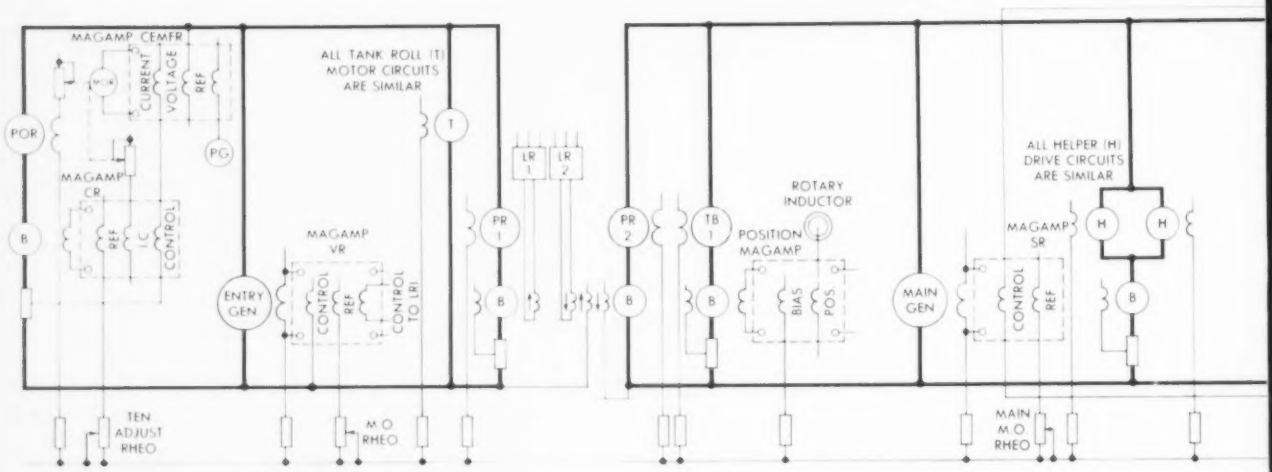
Here's another big development in the steel industry →

*Trade-Mark

YOU CAN BE SURE...IF IT'S

Westinghouse





Tin-plate annealing equipment designed for . . .

Process speeds beyond 2000 fpm, output 60 tons per hour!

Tin-plate annealing lines now being built will be capable of boosting output as much as 100% over existing continuous lines.

Continuous annealing lines are from 300 to 400 feet in floor length. Since the strip travels through many vertical passes, several thousand feet of tin plate are accommodated in the line between the pay-off and winding reels.

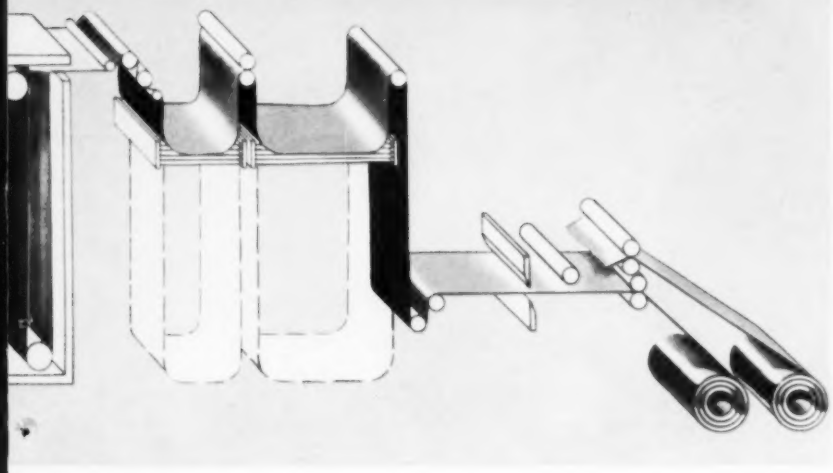
High-speed annealing operations like this demand the ultimate in coordination and reliability. Westinghouse motors, controls, furnaces and related equipment will help you handle speed and output up to and beyond 2000 fpm, 60 tons per hour—while maintaining precise quality standards. Moreover, Westinghouse accepts full unit responsibility for the electric and furnace equipment installed in your line.

How Line Control Operates

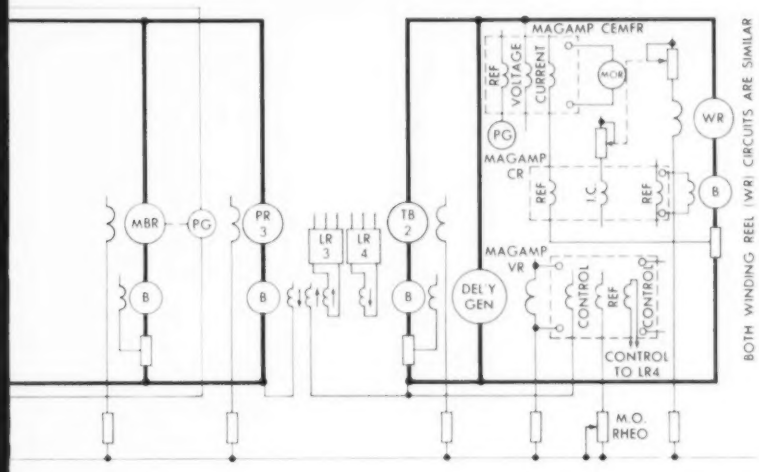
Westinghouse has many years of successful experience applying MAGAMP regulators to drive systems. Above diagrams show how Westinghouse MAGAMP regulators are applied in modern, continuous annealing lines.

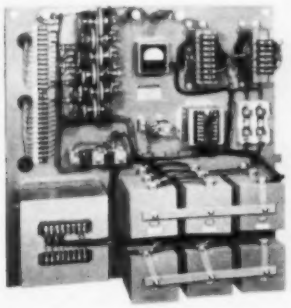
MAGAMP speed regulator (SR) maintains constant speed through the critical annealing zone. Speed reference, set by main motor-operated rheostat (MOR), is

YOU CAN BE SURE...IF IT'S Westinghouse



Centralized line control reduces space requirements and provides ready accessibility for inspection.





Magamps bring outstanding precision, dependability to line control . . . no moving parts, brushes, commutators, bearings.

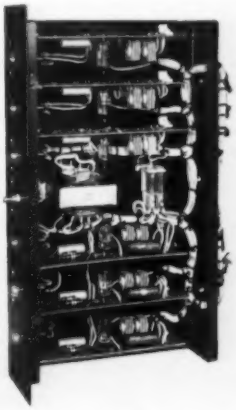
balanced by the control winding fed from the pilot generator (PG) driven by the master bridle roll (MBR).

MAGAMP voltage regulators (VR) control the voltage of the entry and delivery generators assuring fast, even acceleration and deceleration and a minimum of loop disturbance during steady operation. Loop regulators set as verniers in controlling generator voltages.

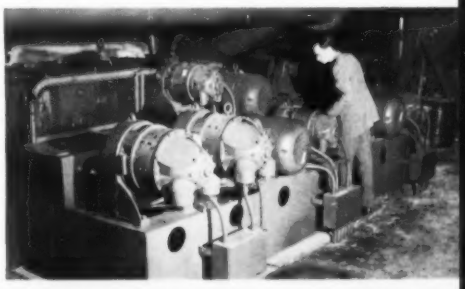
MAGAMP current regulator (CR) for booster, and MAGAMP counter-EMF regulator (CEMFR) for motor, work together so regulated tension is maintained by the pay-off reels (POR) and winding reels (WR). Inertia compensation (IC), proportional to accelerating loads, and stall tension signals are introduced through the (CR) circuits.

Photo-thyratron loop regulators (LR) provide modulated control of storage loops for smooth operation.

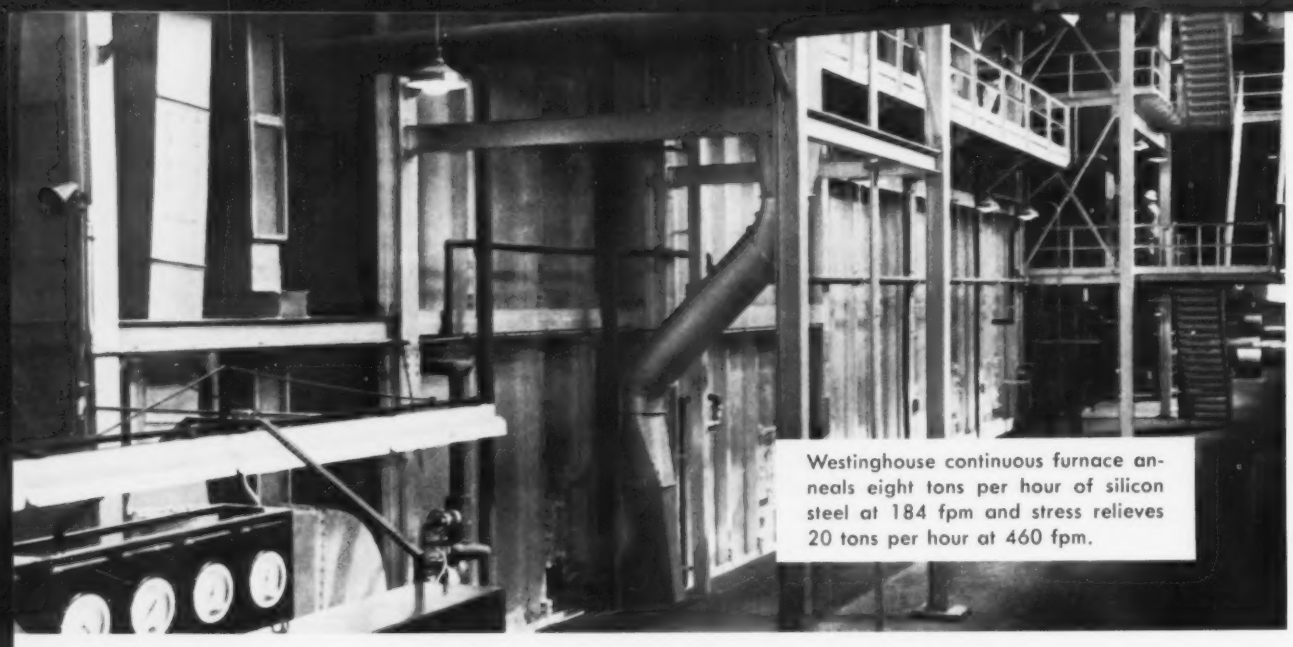
Machine characteristics are selected for best drive performance. Pinch roll no. 1 (PR-1), master bridle roll (MBR), and tension bridle no. 2 (TB-2), the pacesetters of their respective line sections, are shunt-wound for flat, speed-load characteristic. Helper drives (H) have high drooping characteristics which result in their developing only the power required to overcome their friction losses and inertia loads. Reel motors have high overload capacities suitable for accelerating the large coils which are now used in most mills.



New Westinghouse fault finder monitors control circuits simultaneously, indicates faults instantly and makes trouble-shooting easy.



Westinghouse d-c motors perform efficiently under tough conditions. High starting torque ideal for high inertia loads.



Westinghouse continuous furnace anneals eight tons per hour of silicon steel at 184 fpm and stress relieves 20 tons per hour at 460 fpm.

Three ways Westinghouse furnaces match increased annealing speed

Westinghouse gas and electric furnaces meet the demands of today's high-speed thermal processing and annealing lines three ways:

Construction—furnace layout compensates for thermal expansion. Maximum accessibility provided for convenient replacement of burner and heating element panels and rethreading.

Temperature Control—Typical examples are: proportioning-type controls to regulate recuperative radiant tubes in gas-fired furnaces; Furnatron® regulators to maintain constant temperatures in electric furnaces.

Atmosphere—Westinghouse atmosphere generators provide controlled and protective atmosphere which maintains product quality at higher speeds. Strip is produced flatter, more uniform . . . surface is cleaner.

Westinghouse consulting, application and design engineers can speed equipment installation, eliminate problems right from the start. They help match correct products to the job, test them to assure proper operation.

From planning or problem, to design, installation and start-up . . . Westinghouse is at your service. An experienced Westinghouse team will work with your engineering staff and consulting engineers in setting up your thermal process line.

For your convenience . . . 38 manufacturing and repair service plants superbly equipped for repairing all types of electric apparatus . . . 34 renewal parts warehouses strategically located in industrial centers, open 24 hours a day.

Contact your Westinghouse sales office for further details. Ask for a copy of B-6072, *Westinghouse Drives for Processing Lines*. Or write, Westinghouse Electric Corporation, 3 Gateway Center, P. O. Box 868, Pittsburgh 30, Pennsylvania.

MP-3044

Completely self-adjusting, magnetic, d-c motor brake assures safer, more positive stops and starts. Maintenance and replacements minimized.

Westinghouse engineers help you plan installations like this compact a-c control center for fans, pumps and other auxiliary equipment.

YOU CAN BE SURE...IF IT'S Westinghouse

This GIANT sleeps just once a year

-on Christmas Day

Built at a cost of $2,600,000 by Marion Power Shovel Company, *The Mountaineer* costs $1,000 an hour when idle. As a result, it just isn't permitted to be idle—except on Christmas Day. The rest of the year, it works 24 hours *every day* at the world's largest strip mine, owned by Hanna Coal Company.

Tough, durable USS "T-1" Steel in the dipper, dipper stick, bail and crowd rack helps *The Mountaineer* do more work than any other power shovel in all the world. This machine can pick up 90 tons of overburden in one bite, pile it 290 feet away, to a height of 100 feet, and swing back for another 90-ton load—all in just 45 seconds! Working at this rate, it can move 7 million yards of overburden a month.

And every yard is tough going. USS "T-1" Steel parts must ram through rock and earth, taking terrific impact and shock, even in the dead of winter. They hold up in this service because USS "T-1" Steel retains its amazing toughness at temperatures far below zero . . . and has excellent resistance to impact abrasion.

Weight was saved with USS "T-1" Steel too—a total of 40 tons!—because of its very high yield strength of 90,000 psi and its excellent weldability. In spite of the high strength, Marion had no difficulty welding, forming, and machining this high-quality alloy steel.

• • •

USS "T-1" Steel can help *you*. Consider it where you need high strength, extraordinary toughness, resistance to impact abrasion, or good creep rupture strength *combined* with ease of fabrication. We'll gladly help you adapt it to your particular problem. United States Steel, Pittsburgh 30, Pennsylvania.

USS "T-1" CONSTRUCTIONAL ALLOY STEEL

UNITED STATES STEEL

UNITED STATES STEEL CORPORATION, PITTSBURGH
COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO
TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA.
UNITED STATES STEEL SUPPLY DIVISION,
WAREHOUSE DISTRIBUTORS, COAST-TO-COAST
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

USS

"We forged 10-foot rings from a 5-foot ingot... in stainless steel"

says **John Matthews,**

U. S. Steel General Foreman—Forging

It required many days to take the photographs on this page, days of forging and re-heating. The forgings are made from type 304 stainless steel, and they're destined for a nuclear power plant. Now read why it took so long to make them.

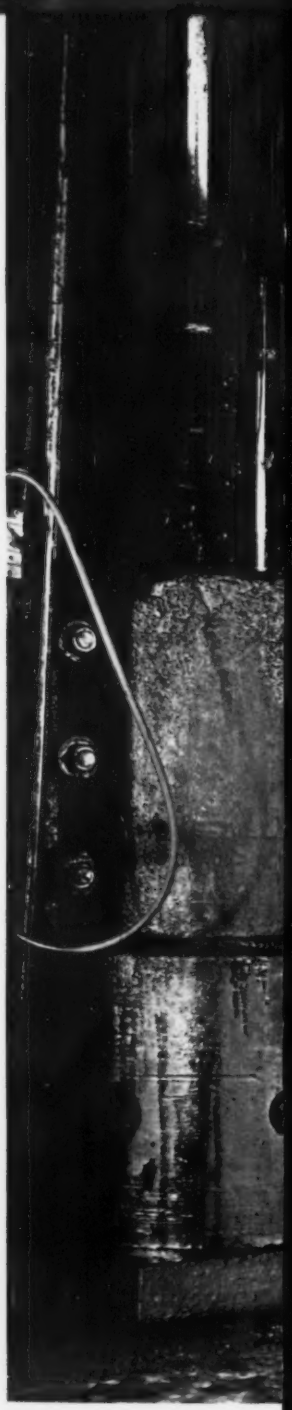
Stainless is strong and stiff, even at forging temperatures. It requires more passes through the press, more die pressure, and the dies wear out faster. If you forge it too long, so that it gets "cold," it will develop small surface cracks beneath the great jaws of the press.

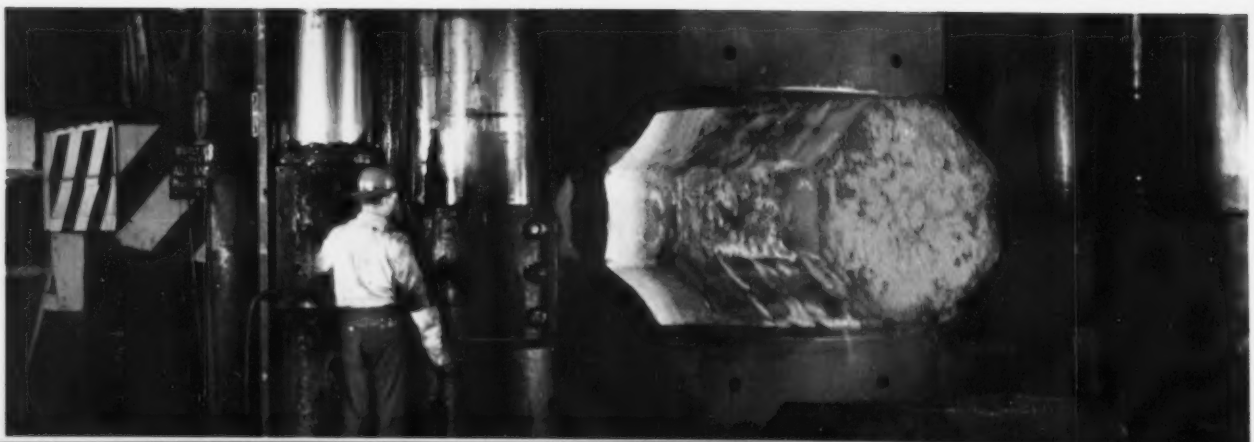
In John Matthews' words:

"We started with a 59″ fluted ingot and forged it down to a 40″ octagon, then sliced it into three flat discs. The thickest disc was forged down to 18″, and we put a 23″ hole through it with steel punches. Then it was worked over the big steel mandrel to finished size: 119″ outside diameter, 80″ inside diameter, 10½″ thick. The other two rings were somewhat thinner."

It was a tricky job, but USS Quality Forgings like this are being turned out every day because we've got the men with the skill to do the job right.

We'll certainly appreciate your inquiries. Send them, or requests for our free 32-page booklet on USS Quality Forgings to: United States Steel, Room 2801, 525 William Penn Place, Pittsburgh 30, Pa.





USS QUALITY FORGINGS

heavy machinery parts . . . carbon, alloy, stainless
forged steel rolls and back-up roll sleeves
electrical and water wheel shafts
specialty forgings of all types

UNITED STATES STEEL

Refractory concrete lining is ready to give rugged service under a variety of temperatures in this forge furnace at Homestead Works, U. S. Steel Corporation, Munhall, Pa. Furnace built by: Amsler Morton Corp., Pittsburgh.

Get maximum durability in refractory installations by using Atlas LUMNITE* cement

- Lumnite-made refractory concrete resists extreme variations in temperature and thermal shock due to rapid heating and cooling.
- Durability under severe operating conditions is assured.
- Placement is fast and easy — service strength is reached within 24 hours. (For maximum convenience, use Lumnite-made castables. These are premixed, ready for use, and are made by leading manufacturers of refractories.) For more information, write: Universal Atlas, 100 Park Avenue, New York 17, N. Y.

UNIVERSAL ATLAS CEMENTS

USS

* **"LUMNITE"** is the registered trademark of the calcium-aluminate cement manufactured by Universal Atlas Cement Company.

L-141

UNIVERSAL ATLAS CEMENT COMPANY—member of the industrial family that serves the nation—**UNITED STATES STEEL**

OFFICES: *Albany · Birmingham · Boston · Chicago · Dayton · Kansas City · Milwaukee · Minneapolis · New York · Philadelphia · Pittsburgh · St. Louis · Waco*

Exclusive with the Heroult:

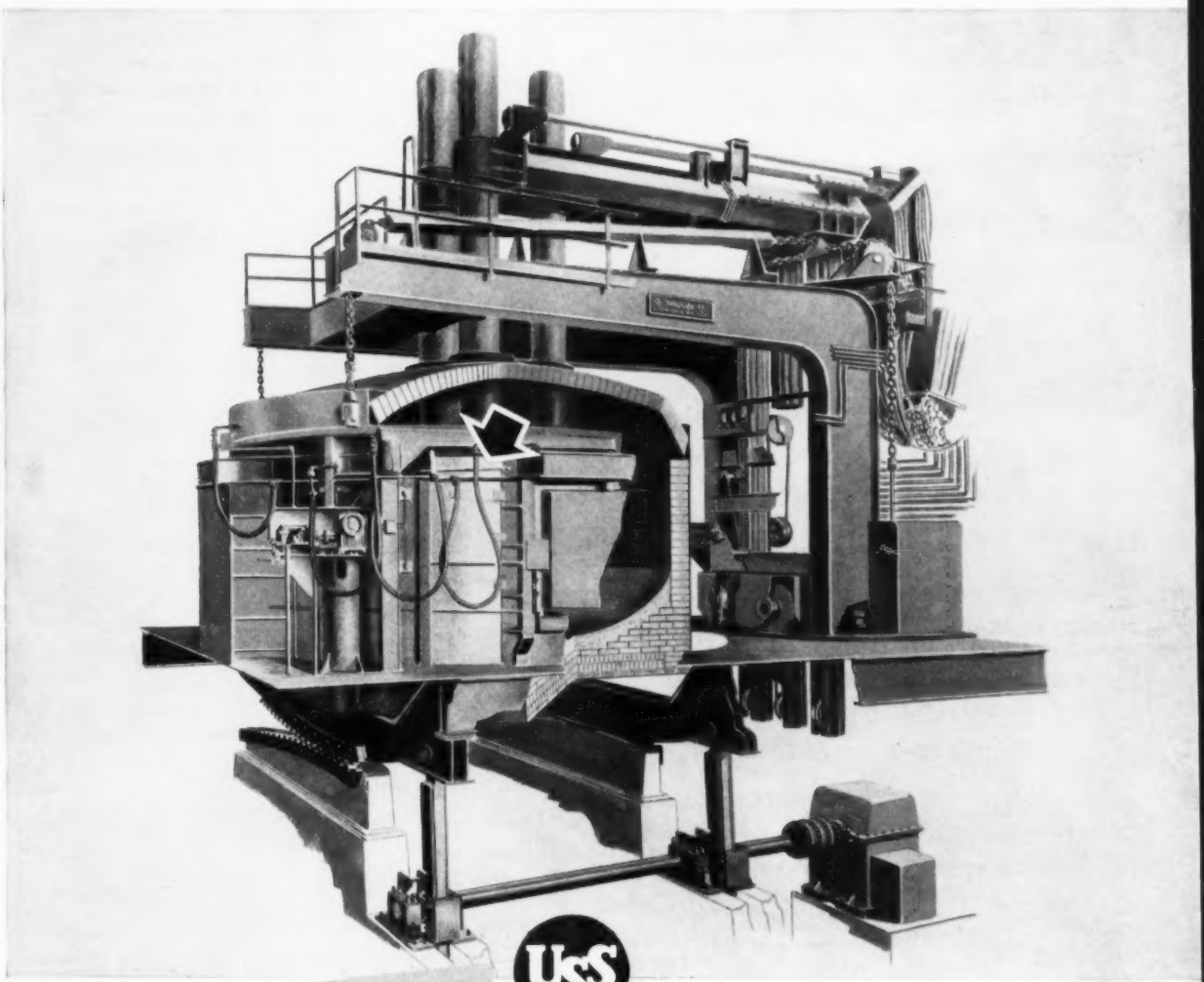
Cage-Type Shell Construction

The Heroult is the only electric furnace on the market with a cage-type shell. In this exclusive design, the shell plates are loosely attached to a heavy structural supporting cage, which allows the plates to expand and contract freely, thus minimizing shell distortion due to extreme changes in temperature. This type of construction also permits easy replacement of damaged shell plates.

This cage-type shell construction is just one of the many advantages you get in the Heroult—advantages which make for performance efficiency, operating economy, and low-cost maintenance. Other exclusive features are: 100% mechanical operation; independently supported operating mechanism; flat bottom shell; and skew back roof ring.

The new Heroult Electric Melting Furnaces are available in sizes of shell diameter ranging from 7′ 0″ up, and with capacities of from 6,000 lbs. up to 400,000 lbs. and greater. They can readily be furnished with a non-magnetic shell bottom section to accommodate induction-stirring equipment. Gantry-type top-charge furnaces, door-charge furnaces, and special furnaces for duplexing and non-ferrous melting can also be supplied.

We welcome an opportunity to help you select and install the Heroult best suited to your requirements. An inquiry to the nearest office will bring complete details.



Heroult
ELECTRIC
MELTING FURNACES

AMERICAN BRIDGE DIVISION
UNITED STATES STEEL CORPORATION, GENERAL OFFICES:
525 WILLIAM PENN PLACE, PITTSBURGH, PA.
Contracting Offices in New York, Philadelphia, Chicago, San Francisco and other principal cities.
United States Steel Export Company, New York

SEE THE UNITED STATES STEEL HOUR. It's a full-hour TV program presented every other week by United States Steel. Consult your local newspaper for time and station.

UNITED STATES STEEL

JEFFREY PRODUCTS for every industry

original or replacement service

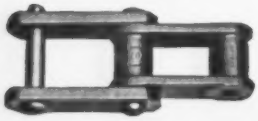
Your materials-handling and power-transmission equipment will give more efficient, economical operation if you specify time-tested, dependable Jeffrey products. Replacement parts have the same sound design as original parts; materials and workmanship are the finest. Into each has gone Jeffrey's long experience in engineering and building elevating, conveying and processing equipment. Stocked for your convenience by distributors and factory.

JEFFREY CHAINS

a type and size to meet every service requirement

Detachable Link

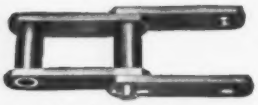
"H" Type Mill



Combination

"800" Class Steel Bushed

"400" Class Pintle



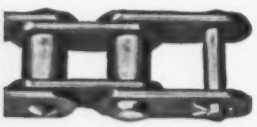
Steel Knuckle

"700" Class Pintle

"H" Type Refuse

STEEL THIMBLE ROLLER DRIVE CHAINS

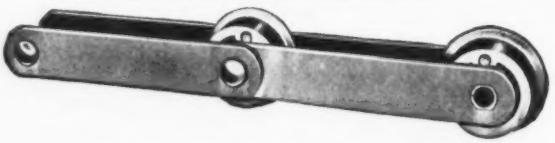
(in pitches from 1.5 to 7.0 inches)



With Straight Side Bars

With Offset Side Bars

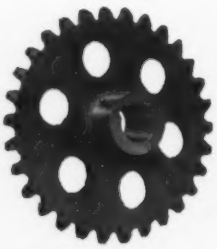
FOR SPECIAL APPLICATIONS



Long pitch Steel Thimble Roller Chains for elevating and conveying service

SPROCKET WHEELS

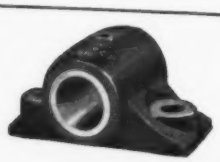
Solid or Split Sprockets Cast Iron or Cast Steel



"STEELCARVE" Flame Cut Steel Sprockets with Welded Hubs

Multiple Width Drive Chain Sprockets

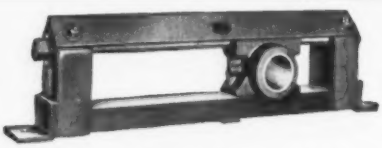
Style K



Style J

Solid or Split Babbitted Pillow Blocks, packaged for protection and convenience. Also Anti-Friction Pillow Blocks.

Style DS Take-Up



Take-ups of various styles—plain or anti-friction bearings

ATTACHMENTS various styles for every type of chain

A-42 with C Wing

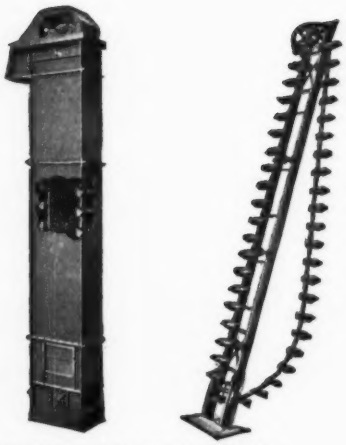
H-2

S-1

A-1

K-2

G-6



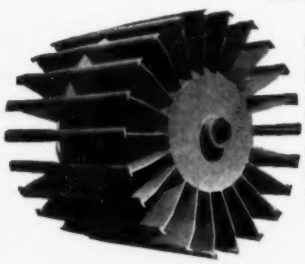
BUCKET ELEVATOR PARTS
Chains, sprockets, pulleys, takeups

BUCKETS
Various styles of iron or steel for replacement service

Friction Type Holdbacks

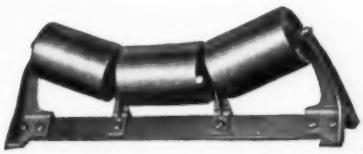
Cast Tooth Spur Gears

BELT PULLEYS



Slatted Pulleys for use on belt conveyors and elevators to prevent material from lodging between pulley and belt

Steel Belt Conveyor Pulleys for belt widths from 14" to 60"



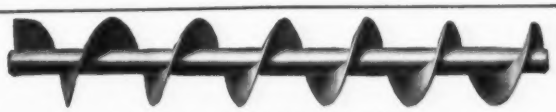
BELT IDLERS

Troughing Idlers for belt widths from 14" to 72"

Impact Absorption Idlers for use at loading or transfer points

Rubber Disc Return Idlers for conveyors handling materials having a tendency to stick to belt

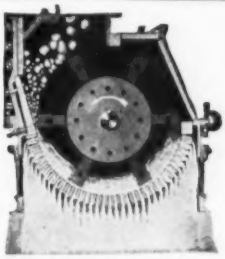
Flat Belt Carrying Idlers for belt widths from 14" to 48"



SPIRAL CONVEYOR PARTS
Various styles of conveyor flights ranging from 4" to 24" in diameter

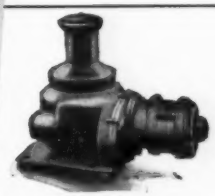
Plain End Bearings

Hangers of various styles

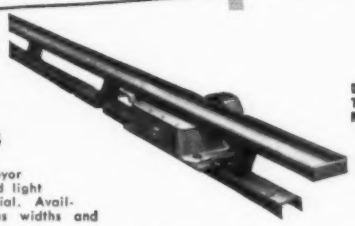


SWING HAMMER MILLS
for reducing limestone, gypsum, coal and similar material to a degree of fineness required for industrial purposes.

BIN VALVES
Cast Iron Clam Shell Type



CAR PULLERS
for spotting railroad cars



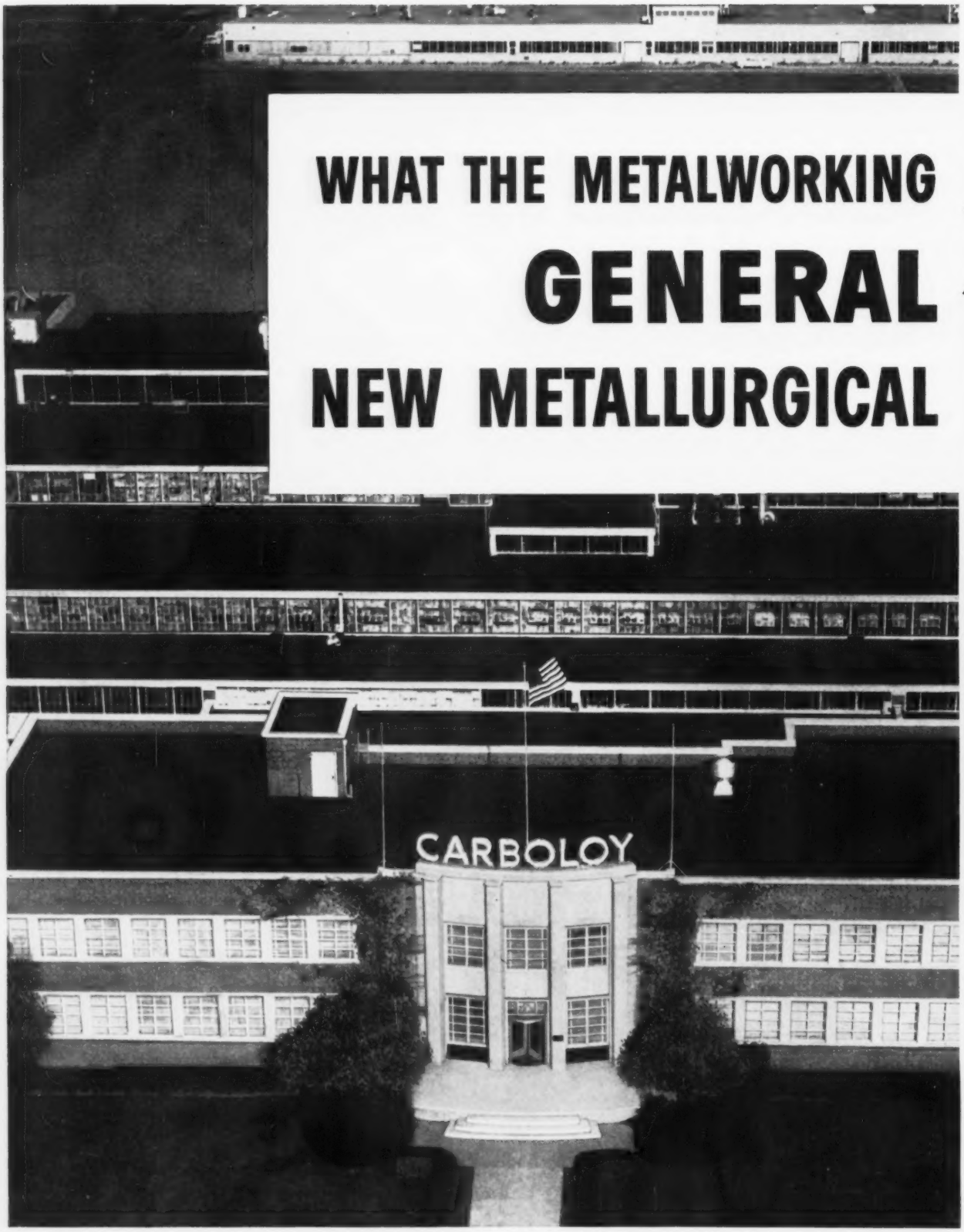
VIBRATING CONVEYORS
Type LMV low-headroom conveyor for medium and light granular material. Available in various widths and lengths.

DUST-TIGHT FEEDERS
Vibrating motor gaps protected from magnetic dust or explosive dust.

Jeffrey chains, belt idlers, pillow blocks, take-ups, belt conveyor pulleys, sprockets, spiral conveyors and other equipment are all designed and built for maximum performance. Available through leading distributors.

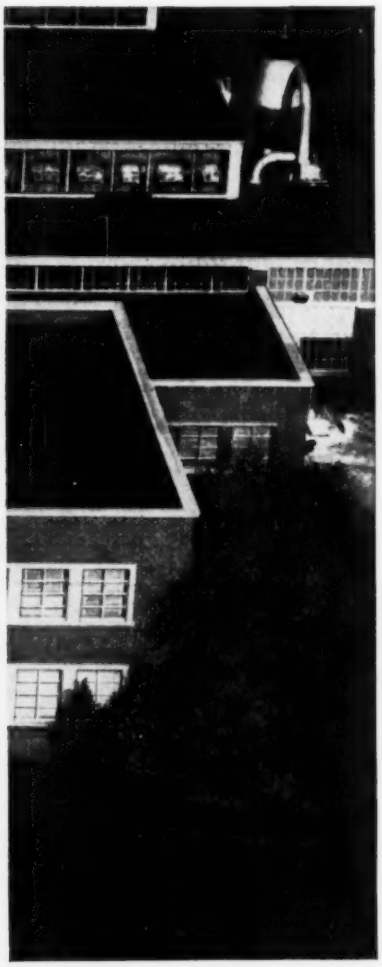
JEFFREY

THE JEFFREY MANUFACTURING COMPANY • COLUMBUS 16, OHIO



Headquarters of the Metallurgical Products Department of General Electric Company, 11153 E. 8 Mile Blvd., Detroit 32, Michigan. Carboloy Cemented Oxide and carbides are made here. G-E permanent magnets and specialty resistors are manufactured in the Edmore, Mich., plant.

INDUSTRY CAN EXPECT FROM ELECTRIC'S PRODUCTS DEPARTMENT



The new G-E Metallurgical Products Department is the successor to the Carboloy Department. Here's what this change will mean for you.

Since 1928, the General Electric trademark "Carboloy" has been identified with a brand of cemented carbide. But today, Carboloy® cemented carbides are just one of a broad range of products which bear the famous Carboloy trademark.

Cemented Oxide, the Machinability Computer, toolholders, diamond dressers, drawing and forming dies . . . these are on the market today. Tomorrow, you will see many other new-product developments for the Metalworking Industry.

With carbides like the new Extra-Performance Series 300 steel-cutting grades, these products are being made available to you through a distribution team which is unmatched in the carbide industry from the standpoint of inventory, delivery, and service.

In addition, the Metallurgical Products Department makes other products which carry only the General Electric trademark: permanent magnets, vacuum-melted alloys, hevimet, thermistors, and Thyrite® varistors. And on the industrial horizon are G-E man-made diamonds.

Thus, the new departmental name symbolizes the broadened scope of this Department's activities. Equally important, it indicates how vitally interested General Electric is in the Metalworking Industry.

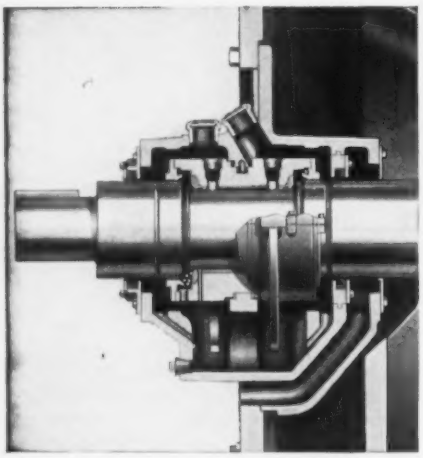
Many of the products listed above are the result of fundamental investigations carried out at the G-E Research Laboratory in Schenectady. Many new developments in machining, forming, and drawing techniques are the work of G-E Engineers. And, when new products and methods are developed for the Metalworking Industry by General Electric, they, too, will come to you from the Metallurgical Products Department.

Progress Is Our Most Important Product

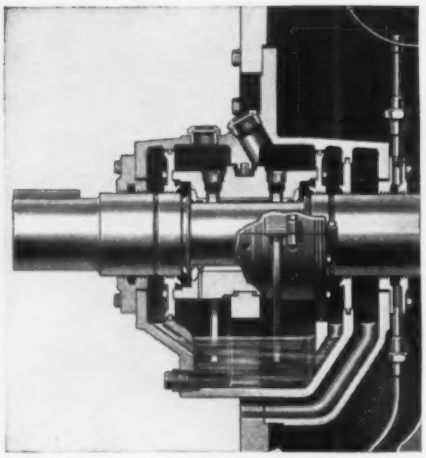
GENERAL ELECTRIC

NEW Bearing Design Means Better Motor Performance

Allis-Chalmers capsule-type sleeve bearings now perfected for complete motor line



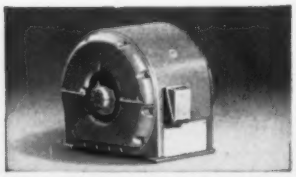
Standard capsule-type sleeve bearing



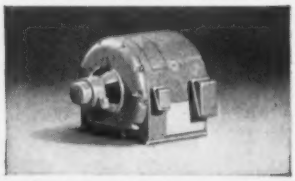
High speed capsule-type sleeve bearing

A new feature—an improved capsule-type bearing design—has been added to the Allis-Chalmers complete line of large end-shield bearing motors. This new bearing will give you better motor service, simplified maintenance and longer motor life through features like:

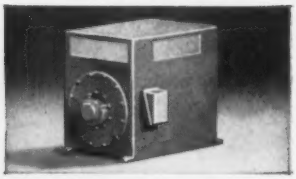
- Dust-tight, leakproof enclosure protects bearing from dirt, dust or abrasive materials.
- Venting system prevents oil leakage — keeps oil and vapor from getting into motor enclosure.
- Dual oil-rings insure bearing surface lubrication — either ring can adequately lubricate bearing.
- Split end-shield gives easy accessibility to winding and air gap — without disturbing capsule or bearing alignment.



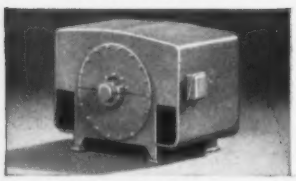
Drip-proof or splash-proof cage motor



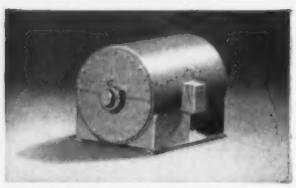
Synchronous or wound-rotor motor



High speed cage motor

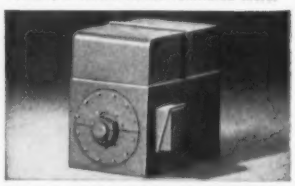


Weather-protected motor



Totally-enclosed fan-cooled motor

Totally-enclosed forced-ventilated motor



Water-cooled or inert-gas-filled motor

Capsule-type bearings are standard on these Allis-Chalmers motors.

You get MORE from Allis-Chalmers motors

More design and construction features — more application help. For complete information, contact your nearby A-C office or write Allis-Chalmers, Power Equipment Division, Milwaukee 1, Wisconsin.

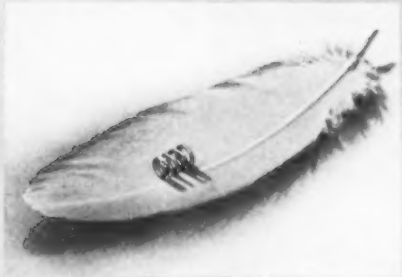
LIVE BETTER ELECTRICALLY

ALLIS-CHALMERS

A-C ALLIS-CHALMERS

A-5032

There's nothing more versatile than a spring



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World's Largest Manufacturers of Precision Mechanical Springs

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WALLACE BARNES STEEL DIVISION—Producer of High-Carbon Strip Steel

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Only one

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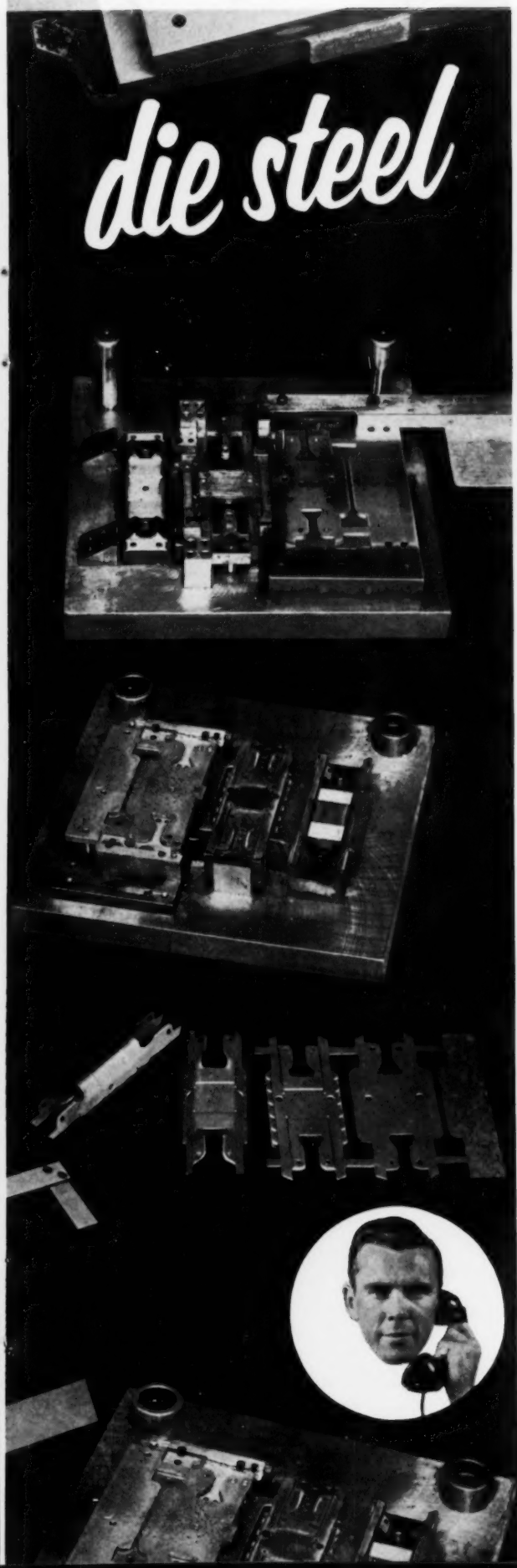
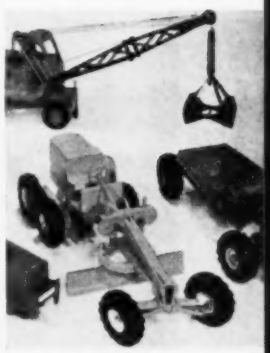


. . . for hundreds of dies like these. Every blueprint specifies "*Carpenter* No. 484 —will accept no substitute"

when you want *RESULTS* . . .



work with tool and die steels that are especially engineered for improvements in products, equipment and methods. For example, this manufacturer of scale model toys discovered that it pays to work with the finest tool and die steels available. So-called "bargain tool steel prices" were actually costing him more in extra finishing and maintenance. That's why every blueprint for their toy dies now specifies, "Carpenter No. 484 (Air-Hard)—will accept no substitute." Results: several million parts per sharpening . . . or a 50% increase in output per grind. The chief engineer reports, "No. 484 is the most economical steel for our work from the standpoint of die life and maintenance. We never have die problems when a job goes into production."

For a complete story on this job, ask your Carpenter representative to show you "Fact File No. 2026." This Report is one of hundreds based on actual plant records given to us by industry to prove conclusively the improved performance obtained with Carpenter Matched Tool and Die Steels. When will you join the growing number of plants who are enjoying better, lower-cost results like these?

when you want *ACTION* . . .

plus economies in your use of specialty steels, dial your nearest Carpenter Mill-Branch Warehouse, Office or Distributor. Service was never faster or better than it is today on Matched Tool and Die Steels, Free-Machining Stainless Steels, and Special-Purpose Alloys from warehouse shelves. You can practically set your own timetable on delivery of a few pounds or a truck-load. No need to stockpile steel in your plant for future use. Call the order desk man who answers your nearest Carpenter number. He's set to give you real service on specialty steels.

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Matched Tool and Die Steels

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Talide® Tools... PROVED BEST BY TEST!

COSTS ONLY $1.65 Leading appliance manufacturer gets superior results with Talide standard brazed-type tool.

Machine..... Gisholt Turret Lathe.
Part..... Stud for automatic washing machine 3/4" dia. x 4" long, 1045 Steel, Rockwell 28 "C".
Operation..... Complete finishing including threading of end.
Tool..... Standard Talide tool AL-10-5/8" sq. x 4", Grade S-90.
Speed (S.F.M.)....400 Feed.....005" Depth of Cut.....003"

	Talide Grade S-90	Next Best Premium Grade
Average No. of pcs. per grind	600	475
Average No. of regrinds per tool	16	14

90 DAYS OF GRUELING TESTS at eastern aircraft engine plant rates Talide Grade S-92 "Best by Test."

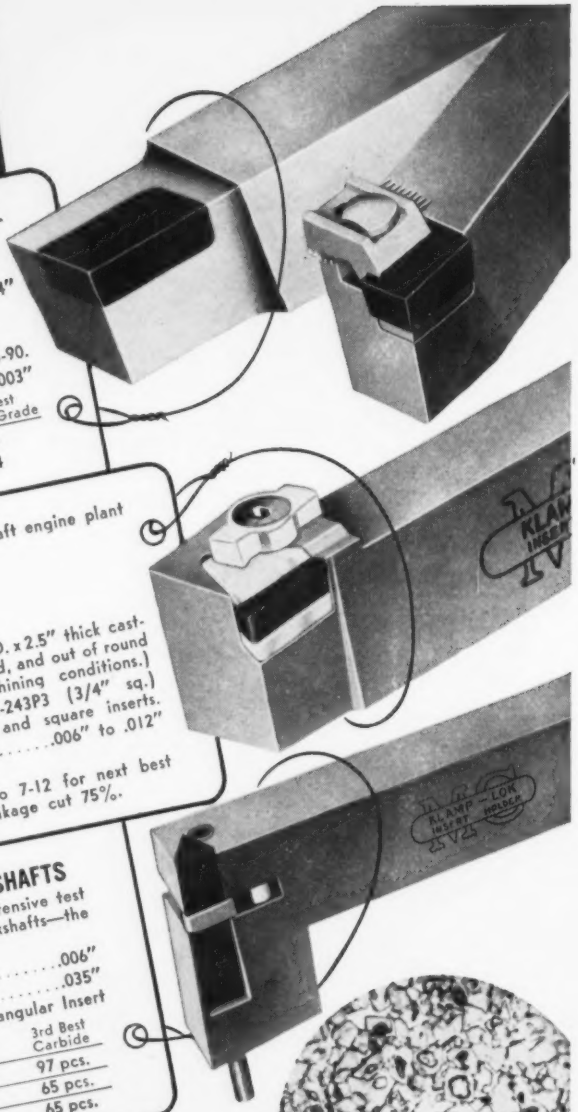
Here is one typical result:
Machine..... 36" Bullard Multimatic
Material..... AMS-5613 Stainless Steel
Operation..... Facing, turning and boring 21" O.D. x 2.5" thick casting to size. (Heavy scale, bead weld, and out of round surfaces presented adverse machining conditions.)
Tools..... TN-163P3 (1/2" I.C.) and SN-243P3 (3/4" sq.) Talide "Throw-away" triangular and square inserts.
Speed (S.F.M.)..... 375 to 1100 Feed..... .006" to .012"
Depth of Cut..... .060 to .500
Result..... 27-34 Pc. average compared to 7-12 for next best premium grade—plus tool breakage cut 75%.

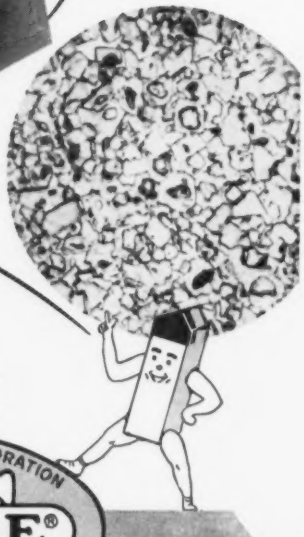
BEST CUTTING METAL FOR MACHINING CRANKSHAFTS

A large midwest automotive plant recently conducted an extensive test to determine the best cutting metal for machining crankshafts—the results proved TALIDE "BEST BY TEST!"

Machine..... Fay Automatic Lathe Feed..... .006"
Speed..... 800 R.P.M. Depth of Cut..... .035"
Cutting Tool..... Style TB-12123 Triangular Insert

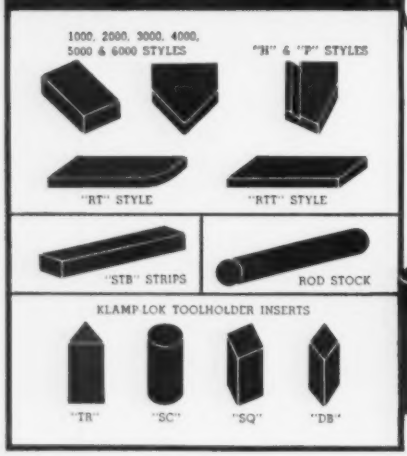
Material	Talide Grade S-90	2nd Best Carbide	3rd Best Carbide
1141 Steel	175 pcs.	120 pcs.	97 pcs.
4140 Steel	128 pcs.	70 pcs.	65 pcs.
Armor Steel	83 pcs.	65 pcs.	65 pcs.





CONSTANT RESEARCH PAYS OFF!

Year after year Talide metal improves in hardness, strength, rupture resistance and crater resistance properties. Processed in latest type vacuum electric furnaces under rigid laboratory control—all Talide grades are uniform and consistent in quality.



Call in a Talide sales engineer to recommend proper tooling for your machining operations, or write for 76-page catalog No. 56-G. METAL CARBIDES CORPORATION, 6001 Southern Blvd., Youngstown 12, Ohio.

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TALIDE®
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HOT PRESSED AND SINTERED CARBIDES • VACUUM METALS
HEAVY METAL • ALUMINUM OXIDE • HI-TEMP. ALLOYS
OVER 25 YEARS' EXPERIENCE IN TUNGSTEN CARBIDE METALLURGY

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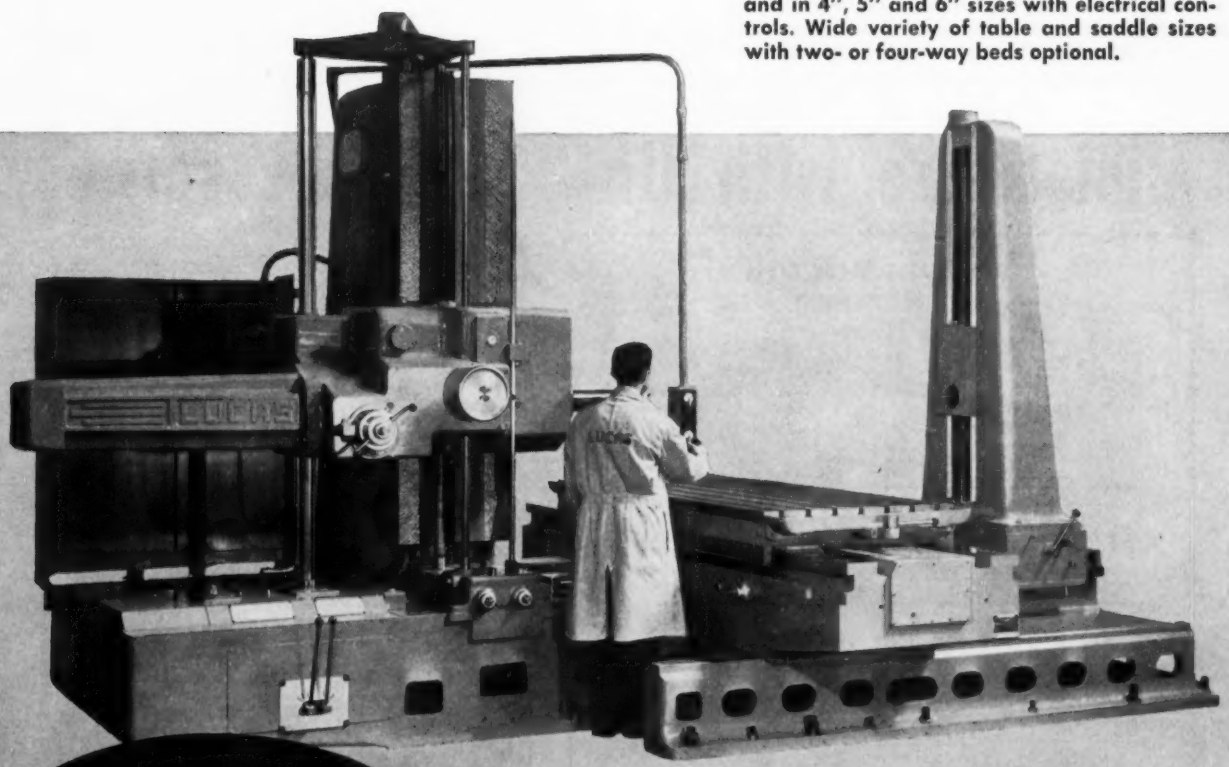
Extreme accuracy, feather-touch pendant control, automatic power positioning for repetitive work make a Lucas the most useful machine in any shop. There's a model and size for *your* horizontal boring, drilling and milling operations. Lucas Machine Division, The New Britain Machine Company, 12302 Kirby Avenue, Cleveland 8, Ohio.

A complete range of models, built in 3", 4" and 5" spindle sizes with mechanical controls and in 4", 5" and 6" sizes with electrical controls. Wide variety of table and saddle sizes with two- or four-way beds optional.



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A DIVISION OF THE NEW BRITAIN MACHINE COMPANY

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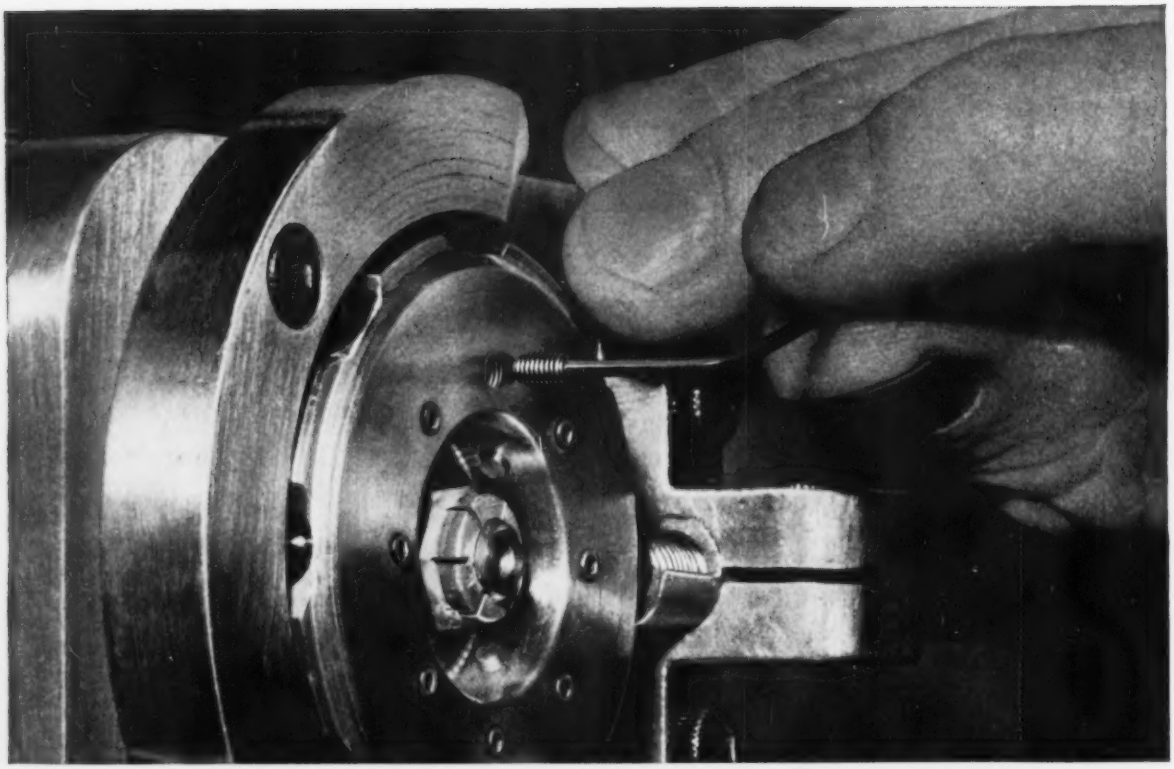


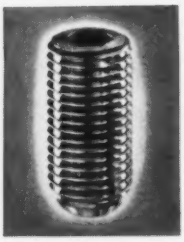
Microsize UNBRAKO socket screws simplify design problems—even in highly specialized equipment like this prototype precision loading device for use in advanced automated production operations.

Miniaturize with UNBRAKO set screws

HEAT-TREATED ALLOY STEEL*
PLAIN CUP POINT
Class 3 Fit Standard

Diameter		Threads per inch NC	Threads per inch NF	L Overall Length	Recommended Installation Torque in Inch-Pounds NC	Recommended Installation Torque in Inch-Pounds NF	Weight per Box of 100 in Pounds
#0	D .060 F .028	..	80	1/16	..	.5	.01
		..	80	3/32	..	.5	.01
		..	80	1/8	..	.5	.01
		..	80	5/32	..	.5	.01
		..	80	3/16	..	.5	.01
		..	80	1/4	..	.5	.01
#1	D .073 F .035	..	72	1/16	..	1.5	.02
		..	72	3/32	..	1.5	.02
		..	72	1/8	..	1.5	.02
		..	72	5/32	..	1.5	.02
		..	72	3/16	..	1.5	.02
		..	72	1/4	..	1.5	.02
#2	D .086 F .035	56	..	1/16	1.5	..	.03
		56	..	3/32	1.5	..	.03
		56	..	1/8	1.5	..	.03
		56	..	5/32	1.5	..	.03
		56	..	3/16	1.5	..	.03
		56	..	1/4	1.5	..	.03
#3	D .099 F .050	48	..	3/32	5.0	..	.04
		48	..	1/8	5.0	..	.04
		48	..	5/32	5.0	..	.04
		48	..	3/16	5.0	..	.04
		48	..	1/4	5.0	..	.04

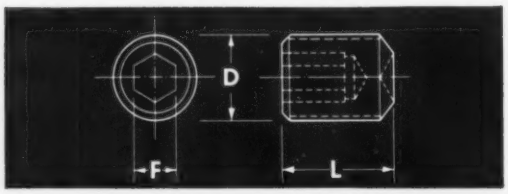
*Also available in stainless steel



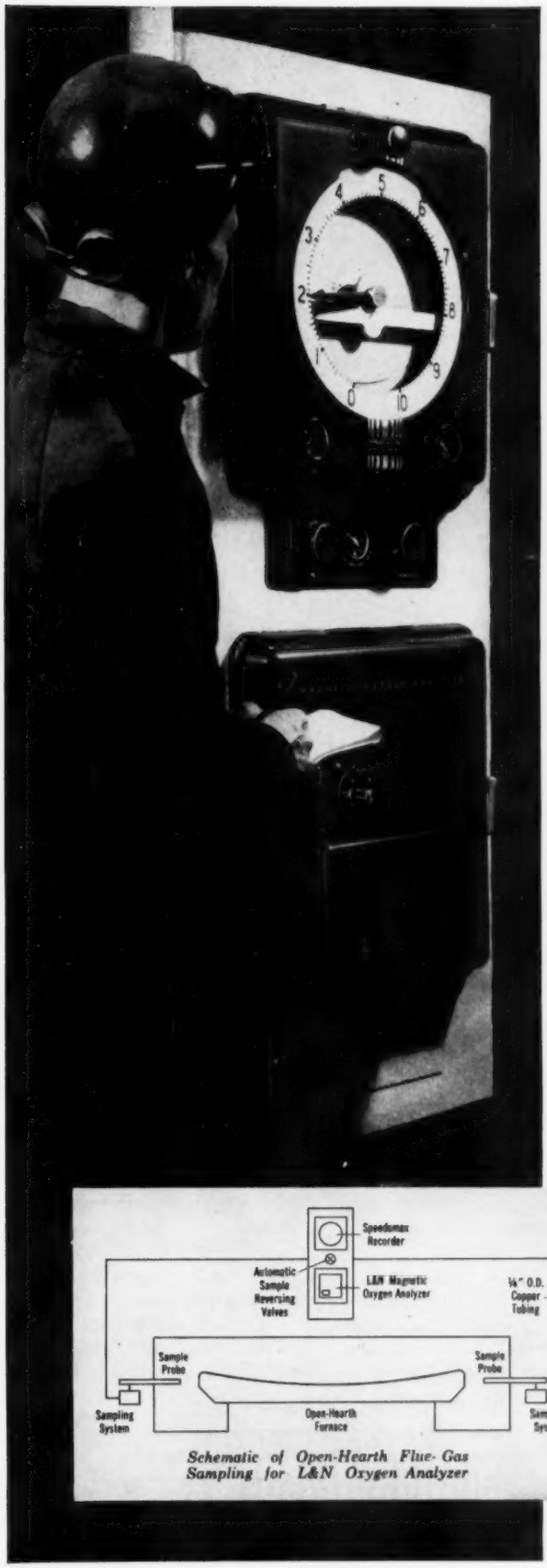
You need not design special set screws to secure your new miniaturized equipment. Microsize UNBRAKOS were developed specifically for use in modern small devices.

UNBRAKO screws are made of carefully selected alloy steel. They are manufactured to timepiece precision. Sockets are deep and uniform for greatest wrench engagement and longest reuse. Threads are fully formed for maximum strength and exact fit. And UNBRAKOS are heat treated to the optimum condition for high tensile strength and ductility without brittleness or decarburization.

Ask your authorized industrial distributor about microsize UNBRAKO socket screws today. Or write us for Bulletin 2055 and samples. Unbrako Socket Screw Division, STANDARD PRESSED STEEL CO., Jenkintown 17, Pa.



STANDARD PRESSED STEEL CO.
UNBRAKO® SOCKET SCREW DIVISION SPS
JENKINTOWN ■ PENNSYLVANIA



For improved O-H combustion practice...

Record O_2 Reliably, Heat after Heat

Key to continuous, reliable records of oxygen in open-hearth exhaust gases is the unique L&N sampling system. Self-flushing, self-cleaning, this assembly delivers a thoroughly scrubbed sample of waste gas to the L&N Magnetic Oxygen Analyzer under positive pressure, without mechanical pumps or aspirators . . . and with very little maintenance.

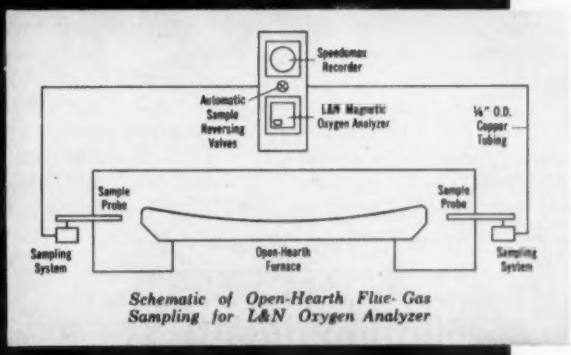
Spray-flushing of the probe opening and internal passages prevents slag buildup and dirt accumulation. The sample gas is drawn from the water-jacketed, stainless steel probe by a steam jet assembly. Expansion of steam accelerates the gas to a high velocity; condensation of the steam scrubs the sample by precipitating all dust and dirt. The cleaned sample travels at 50 ft./sec. in the sampling lines (quarter-inch copper tubing), so that initial response of the *entire* system is only about 10 seconds.

The Magnetic Oxygen Analyzer and the Speedomax G® recorder, calibrated directly in per cent O_2, may be located wherever convenient . . . are quickly checked against air to assure accurate performance.

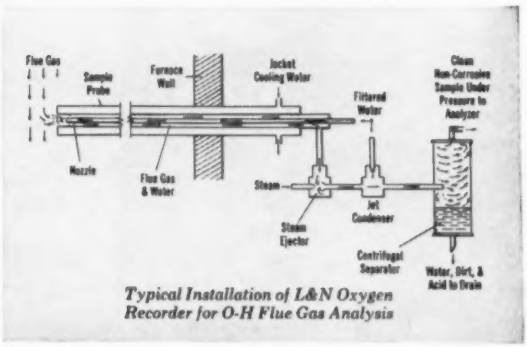
Complete description of this equipment is contained in Process Data Sheet 643(5), available from your nearest L&N representative. Or write us at 4956 Stenton Avenue, Philadelphia 44, Pa.

LEEDS NORTHRUP
Instruments Automatic Controls • Furnaces

In this O-H shop of Jones & Laughlin Steel Corp., Pittsburgh, the L&N O_2 Analyzer is used with a Speedomax G Controller, which adjusts a fuel-air controller (not shown) to provide automatic combustion control.



Schematic of Open-Hearth Flue-Gas Sampling for L&N Oxygen Analyzer

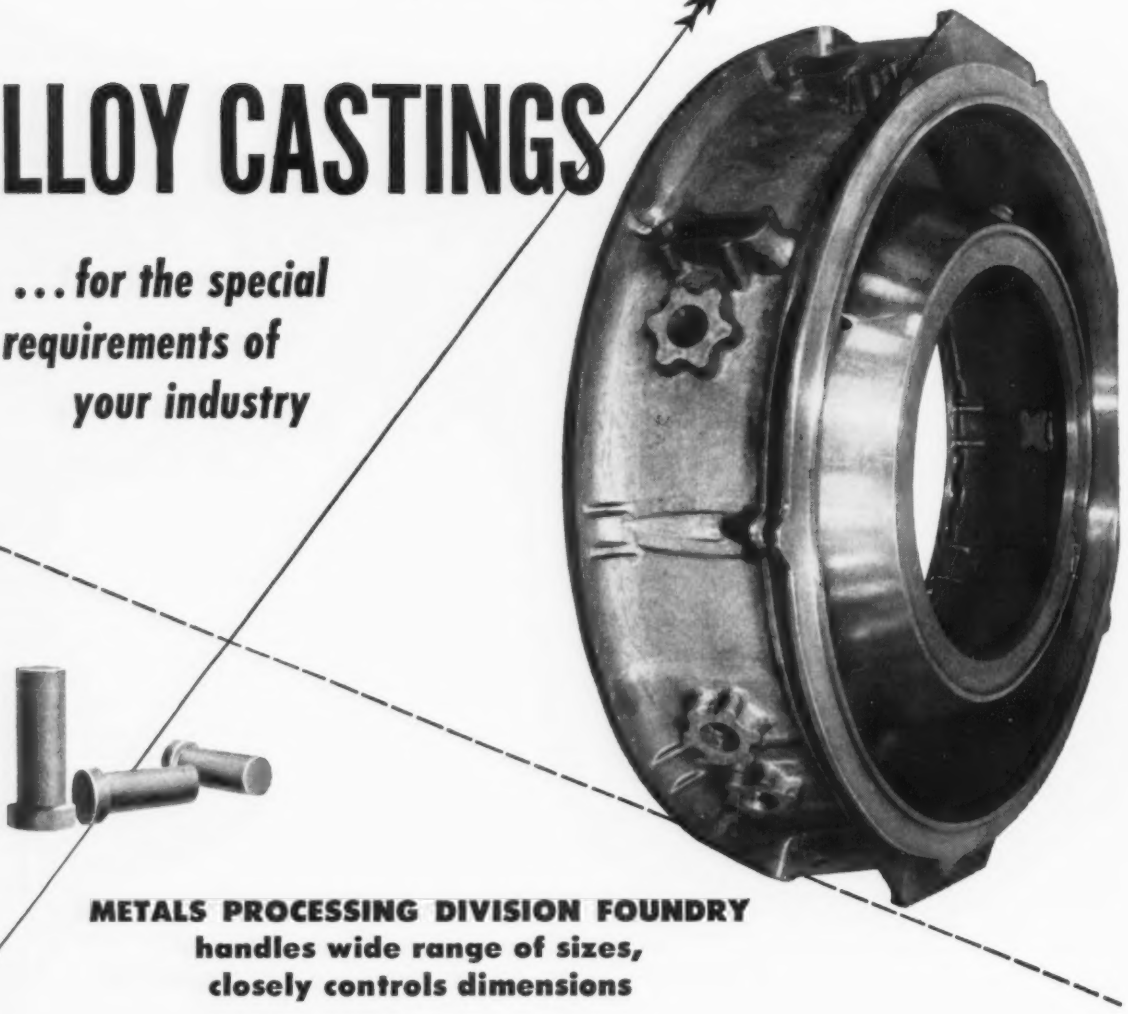


Typical Installation of L&N Oxygen Recorder for O-H Flue Gas Analysis

AIRCRAFT QUALITY

ALLOY CASTINGS

...for the special requirements of your industry



METALS PROCESSING DIVISION FOUNDRY handles wide range of sizes, closely controls dimensions

Precision testing methods provide close control of casting quality

Curtiss-Wright's Metals Processing Division today offers your industry precision castings of critical parts in a wide variety of sizes, and with closely controlled dimensions. For example, in the large casting shown, tolerance is ±.030 over 36″ diameter. From its modern, completely equipped foundry in Buffalo, the Division supplies heat, corrosion and abrasion resistant castings from a full range of special-property alloys, including ductile iron... by sand, centrifugal, ceramic or shell processes.

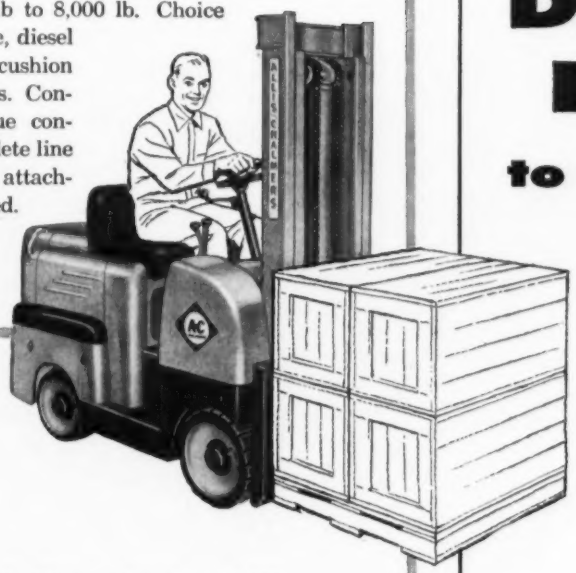
Precision alloying techniques, modern melting controls with spectrometer testing, X-ray control by experienced radiographers — all add up to castings with superior physical and mechanical properties . . . mean better and more dependable products for the critical needs of industry. Qualified design engineering assistance is a part of the comprehensive Metals Processing Division service. Write for details.

72 Grider Street

METALS PROCESSING DIVISION
CURTISS-WRIGHT CORPORATION • BUFFALO, N. Y.

Metals Processing Division Branch Offices: New York • Houston • Los Angeles

Fork Trucks — Over half a hundred models and sizes with outstanding operating and service advantages. Capacities range from 2,000 lb to 8,000 lb. Choice of fuels — gasoline, diesel or LP gas. Solid, cushion and pneumatic tires. Conventional or torque converter drive. Complete line of interchangeable attachments to fit the need.



HERE'S Diversified Handling to meet your needs

Whether you want to lift material, carry it or pull it, here is Allis-Chalmers equipment to do the job with real savings in time and money. Each unit is suited to a specific type of handling. Each is built "from the drawing board up" to deliver top performance.

Ask your Allis-Chalmers Material Handling Dealer to show you how these machines will fit your particular handling requirements.

CHORE BOY Platform Trucks — 2,000 and 3,500-lb capacities. Ideal for shuttle and inter-department delivery, pickup and package distribution, other handling. Large deck holds a variety of material. Is suitable for carrying personnel or for mounting welder, air compressor, other equipment.

CHORE BOY is an Allis-Chalmers trademark.

SHOP MULE Industrial Tractors — thirty gasoline and diesel models with drawbar pulls up to 12,000 lb. Compact, highly maneuverable, these tractors are designed for towing or pushing wheeled vehicles, moving heavy machinery — are also used for maintenance work and operating auxiliary equipment.

See these examples of *Allis-Chalmers Engineering in Action* . . . in action against handling and maintenance costs.

MATERIAL HANDLING DEPARTMENT
BUDA DIVISION, MILWAUKEE 1, WISCONSIN

BH-30

ALLIS-CHALMERS

The world of science behind
EXIDE-IRONCLAD BATTERIES

Being interviewed is H. A. Fuggiti, Acting Senior Development Engineer

"Here's where the heavy slugs of power come from"

At the Exide Laboratories — **Reporter:** Just exactly what part of the battery is that, Mr. Fuggiti?

Fuggiti: This is the Exide-Ironclad positive plate. And in any battery, power reserve is governed by positive plate area.

Reporter: Then do you mean that Exide-Ironclad Batteries have *more* positive plate area?

Fuggiti: Exactly. You can see that here. The cylindrical power tubes are arranged in a row. So the semicircular sides give an effective plate area one-third more than the plate size.

Reporter: How does that increase power reserve?

Fuggiti: Because there's a bigger working surface of battery plate exposed to the electrolyte. Power response is f ster.

Reporter: What does thi mean in battery performance?

Fuggiti: It means the battery can provide power to spare for peak power loads as well as a dependable source for continuous loads.

Reporter: Obviously this is an important feature of the Exide-Ironclad Batteries.

Fuggiti: Yes it is, but it's just one of many engineering details that contribute to their long life and high capacity.

Note to battery users: Whenever you order heavy duty batteries or the equipment that requires them, be sure to specify Exide-Ironclad. For detailed bulletin, write Exide Industrial Division, The Electric Storage Battery Co., Philadelphia 2, Pa.

THE ELECTRIC STORAGE BATTERY COMPANY Exide®

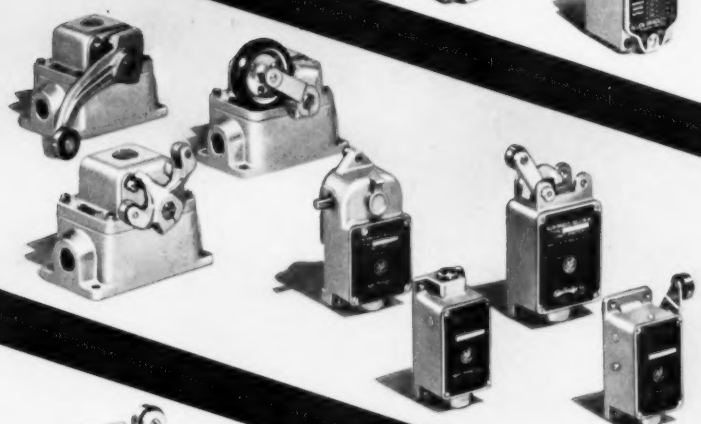
Need a Limit Switch?

WHAT'LL YOU HAVE?

Here are samples of A-B quality limit switches—a line so complete it will satisfy your every requirement!

OILTIGHT

Bulletin 802T—For high-speed production machines. Sealed to protect the switch against oil and coolants.



GENERAL PURPOSE

Bulletin 801—Standard or heavy-duty rating, with roller, push type, or fork lever action, and slow or snap action contacts.

Bulletin 803 Cam Limit Switch used on rotating machines to open and close circuits at any desired angular position.

PRECISION

Bulletin 802—For applications where mounting space is small and operating motion is measured in thousandths of an inch.

1-57-MR

ALLEN-BRADLEY

QUALITY

MOTOR CONTROL

A-B Quality

Allen-Bradley Co., 1316 S. Second St., Milwaukee 4, Wis. • In Canada—Allen-Bradley Canada Ltd., Galt, Ont.

PILOT CONTROLS?

Yes...Allen-Bradley covers the field!

No matter what your needs for pilot control devices may be . . . refer to the new Allen-Bradley "handy" catalog . . . you will usually find what you are looking for. If not, please write Milwaukee, or contact your nearest Allen-Bradley representative.

All pilot controls are made to Allen-Bradley standards of quality. All of them have silver alloy contacts that require no service attention. You'll find it saves service time and money to specify Allen-Bradley.

PHASE FAILURE AND PHASE REVERSAL RELAYS

BULLETIN 812

Style A disconnects motor if one phase of power circuit fails. Style B protects against phase reversal, as well.

OILTIGHT PUSH BUTTON STATIONS

BULLETIN 800T

For machine tool applications, to keep oil away from the contacts. Available in flush, surface, or pendant mounting.

PRESSURE CONTROLS

BULLETIN 836

For noncorrosive liquids, vapors, gases, from 30 in. of vacuum to 700 psi. Accurate, rugged, compact, and attractive appearing.

PLUGGING SWITCHES

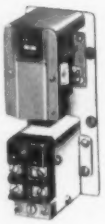
BULLETIN 808P

Used with a simple reversing switch, it provides quick, automatic stopping of machines driven by squirrel cage motors.

TIMING RELAYS

BULLETIN 849

A reliable and accurate pneumatic timer with a range of 1/6 to 180 seconds. Many arrangements. Motor driven, electronic and oil dashpot timers also available.



TEMPERATURE CONTROLS

BULLETIN 837

For temperatures from —45°F to 440°F. Metal bellows operates snap action precision switch with pure silver contacts.

FOOT SWITCHES

BULLETIN 805

For operating punch presses, riveting, welding, and many other machines. Switch has snap acting, normally open and normally closed silver alloy contacts.

ZERO SPEED SWITCHES

BULLETIN 808

A plugging switch that brings squirrel cage motors to zero speed quickly, without any reversal of direction.

FLOAT SWITCHES

BULLETIN 840

Provide automatic control for motors operating tank or sump pumps.

PRESSURE SWITCHES

BULLETIN 830

For domestic water pumps, and commercial and industrial air compressors.

ROTARY SWITCHES

BULLETIN 806

Cam operated switches for the selection or transfer of various control circuits. Silver alloy contacts.

A-B Quality

ALLEN-BRADLEY

MOTOR CONTROL

QUALITY

Allen-Bradley Co., 1316 S. Second St., Milwaukee 4, Wis.

In Canada—Allen-Bradley Canada Ltd., Galt, Ont.

Send for the new 7th Edition of the Allen-Bradley Handy Catalog. It is a veritable encyclopedia of reliable motor control.

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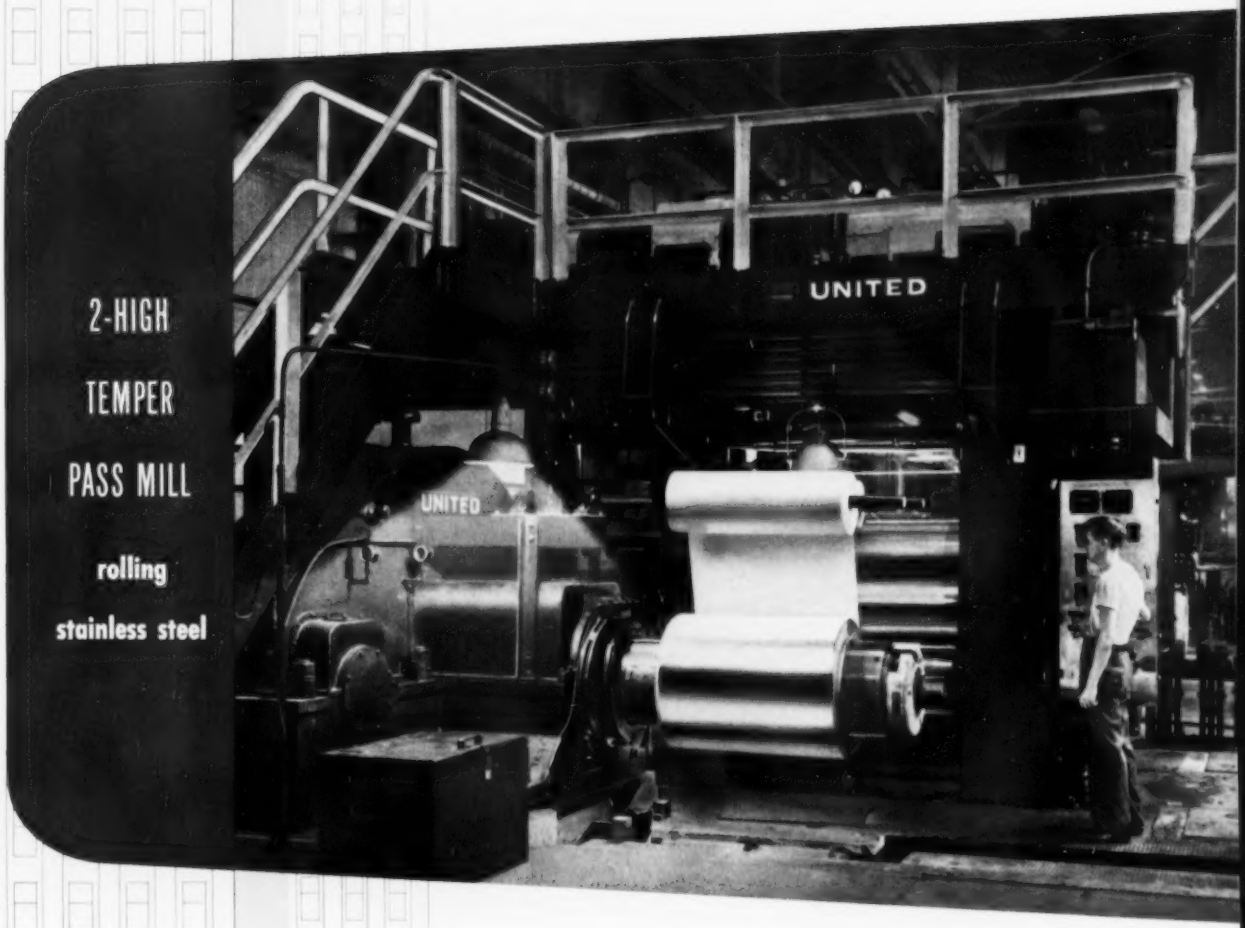
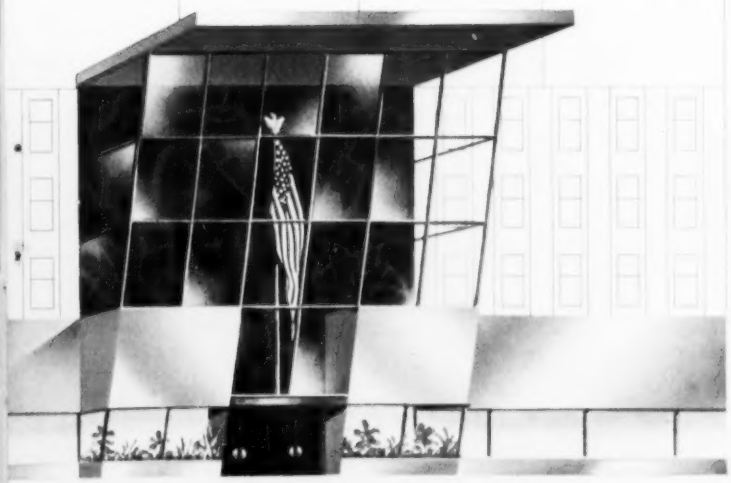


2-HIGH
TEMPER
PASS MILL

rolling
stainless steel

STAINLESS STEEL BUILDING ENTRANCE



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ENGINEERING AND FOUNDRY COMPANY

PITTSBURGH, PENNSYLVANIA

Plants at: PITTSBURGH • VANDERGRIFT • YOUNGSTOWN • CANTON
WILMINGTON (LOBDELL UNITED DIVISION)

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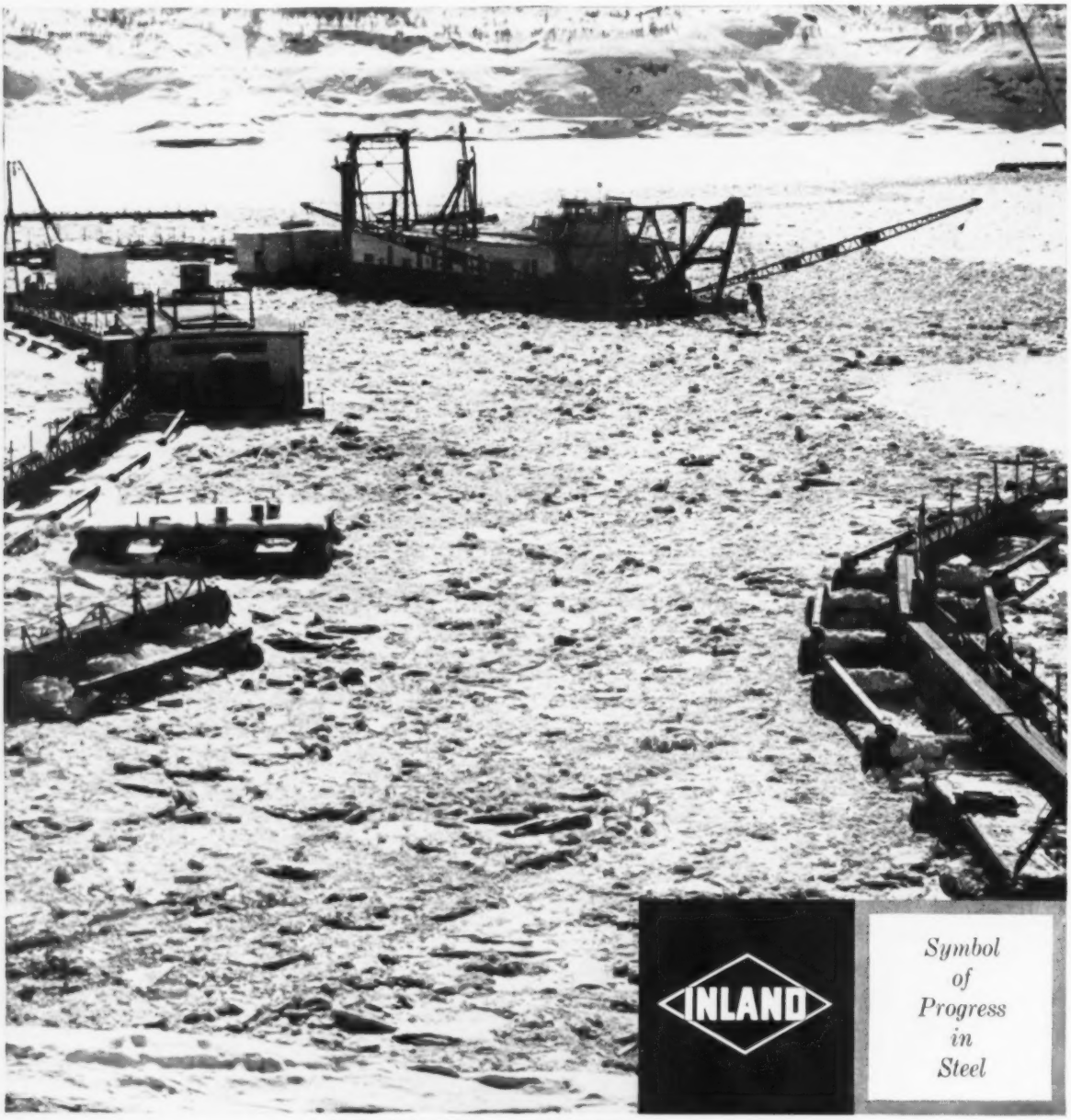
Designers and Builders of Ferrous and Nonferrous Rolling Mills, Mill Rolls, Auxiliary Mill and Processing Equipment, Presses and other Heavy Machinery. Manufacturers of Iron, Nodular Iron and Steel Castings, and Weldments.

UNITED *can serve you no matter where in the world you are.*

How are things in Atikokan?

Up in the wilderness of western Ontario, men are working around the clock, through sub-zero weather to dredge away 180,000,000 cubic yards of clay and silt from the bottom of a 700-acre lake. For underneath Steep Rock Lake, near the town of Atikokan, Inland has proved up a vast body of rich iron ore; enough to supply 3,000,000 tons each year when the new mine is in full production. Payoff: an additional source of an essential raw material to satisfy the needs of Inland Steel users for many years to come.



INLAND

Symbol of Progress in Steel

INLAND STEEL COMPANY • 38 South Dearborn Street • Chicago 3, Illinois

NEWSFRONT

SUB Favors Strict Seniority

Supplemental unemployment benefit programs have altered management thinking on application of seniority provisions of union contracts. Reason: amount and duration of SUB weekly benefits depend on (1) length of continuous employment and, (2) average weekly earnings. Thus, some employers seem more likely to go along with keeping the strictly senior man on the job during layoffs—it costs less.

Cold Extrusion's Ready To Roll

Cold extrusion appears ready for a major breakthrough into high production work. It's been blowing hot and cold for 10 years, with major emphasis thus far on shell production. Its promise now rides with new automatic press equipment. Parts already being made: valve lifters, ball sockets, universal joints.

Better Materials Data Due?

You'll have better data on demands for—and supplies of — hard-to-get industrial materials soon, if U.S. Commerce Dept. has its way. The agency wants to start an efficient accounting system covering such materials. One result would be timelier mobilization information for businessmen. Commerce will ask Congress for starting funds this year; will seek larger appropriations later to expand and improve the project.

Brass People Plan Lateral Play

Smaller brass products manufacturers don't plan on being left at the altar if the higher-tariff bill against imports of foreign brass products falls through. They're preparing to back a lateral play to gain union, public opinion backing. Object: Hit a "support the home team" theme to buck the tough price competition from imported products.

Freight Rates Changing Steel Pattern

Changing freight rates are prompting some involved jockeying by steel makers. One mill shifted part of its pipe production to a waterfront location some time ago, to take advantage of lower barge rates to the Southwest. Another—when special rail rates to Southwest were ruled out—continued rail shipping, but only for faster delivery. Now barge shipments to oil country are picking up again, as delivery pressures ease.

Can Prices Stand The Pressure?

Watch for metalworkers to launch an exhaustive, multi-industry survey soon to see what's behind rising material-and-labor costs. Forging, foundry, machining and stamping firms are seriously concerned over how these costs are rising without corresponding increase in finished product prices. Survey would be initial step towards working out solution.

Pneumatic Tubes Join Maintenance Team

Pneumatic-tube conveyors can often save time on big maintenance or repair jobs. At the maintenance base for one major airline, pneumatic tubes run from the toolroom to the plane overhaul area. Mechanic needn't clamber down from the plane to get an extra tool or blueprint. He simply jots down his request, drops it into a handy tube station, and gets it in a few seconds by return carrier.

Automation's Helpful, But . . .

The annual SAE meeting in Detroit exploded one automation myth: that automatic machinery alone has been behind most recent productivity increases. It's been a big factor. But proper spacing of machines, changes in materials, and improved product designs, the meeting felt, have contributed almost equally as much as has development of improved automatic equipment.

Anyone For Portable Reactors?

Atomic reactors aren't all on the mammoth side. One being developed for the armed forces consists of two desk-sized units which can be parachuted to earth. After hooking up hoses and starting the reactor, it will develop 15 kw of power. Units this size might eventually free residential areas from paralysis in event of central power plant destruction.

Major chemical producer meters flow of catalytic agents with Cleveland Speed Variator

A chemical research worker adjusts the manual control knob on the Cleveland Speed Variator to set the metering speed. Various types of regulating mechanisms can be mounted on the Variator to provide automatic adjustment by remote control.

HOW IT WORKS

Power is transmitted from input shaft to output shaft through alloy steel driving balls which are in pressure contact with discs attached to the two shafts. Relative speeds of the shafts are adjusted by changing the positioning of the axles on which the balls rotate (see cutaway view, left).

IN the research department of a major chemical plant, catalytic agents are metered and their flow varied with precision accuracy. This control is exercised with a Cleveland Speed Variator.

A ¼-horsepower electric motor is connected to the Cleveland Speed Variator driving a pump through a 25-1 speed reducer. Being infinitely variable, the Variator gives stepless speeds over its full 9:1 range—from ⅓ to 3 times input speed. Pumping speed can be varied from 207 to 23 rpm. This provides the necessary speed range for metering the various types of catalytic agents.

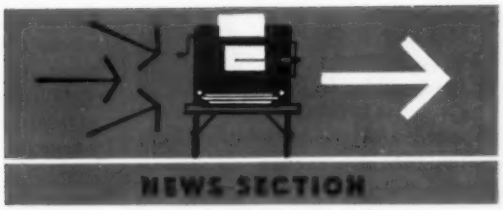
Available in eighteen standard types and sizes, the Cleveland Speed Variator offers these major advantages: 1. An extremely compact unit; 2. Almost any input speed up to 1800 rpm—clockwise or counterclockwise; 3. Constant horsepower output over a 9:1 range, or constant output torque with a 6:1 range; 4. Infinitely variable over entire speed range; 5. Rapid response to speed change, precise adjustment, accurate maintenance of settings; 6. Long life and minimum maintenance; 7. Ample bearing support for overhung pulleys on either input or output shafts.

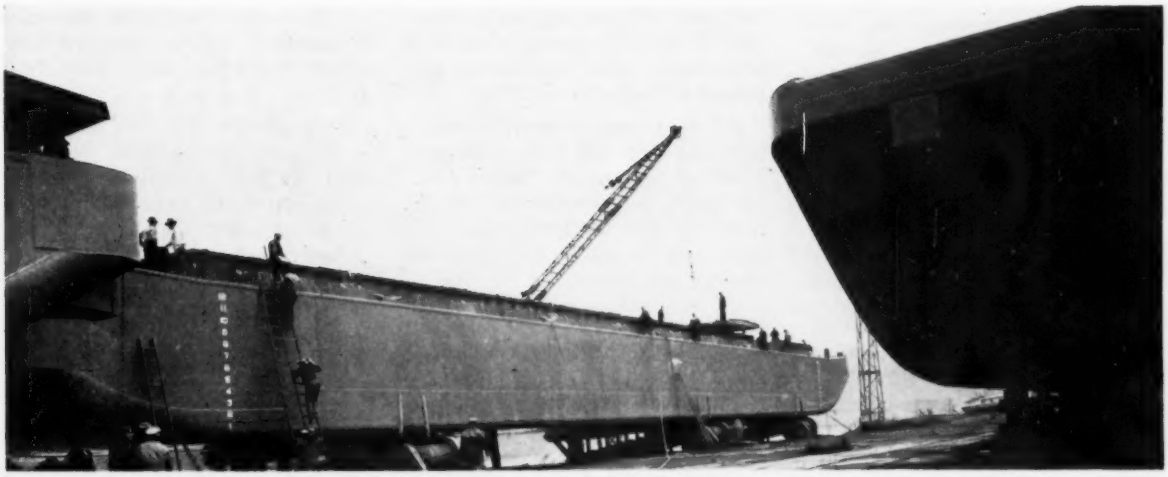
Write for Bulletin K-200 for detailed description of the Cleveland Speed Variator, with photographs, sectional drawings, rating tables and specifications.

THE CLEVELAND WORM AND GEAR COMPANY

Speed Variator Division, 3282 East 80th St., Cleveland 4, Ohio

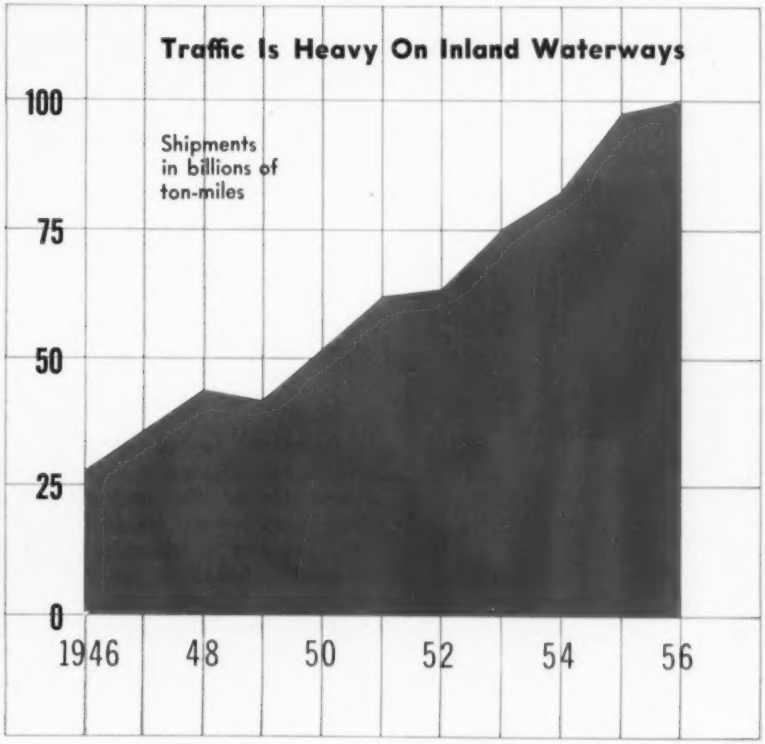
Sales representatives in all major industrial markets. In Canada—Peacock Brothers Limited.





Barge Shipping Rides Boom Currents

Inland waterway traffic last year established a record of over 100 billion ton-miles . . . Bargemen feel that majority of this business is theirs permanently . . . Slowness a disadvantage—By G. J. McManus.



◆ RIVER MEN have stopped rooting for a depression.

Traffic on inland waterways last year topped 100 billion ton-miles. Coming in a boom period, this record tonnage indicates barge builders and operators have outgrown the doubtful honor of being in a depression business.

It used to be that when things went slack, industry turned to water transportation. Time became less important; costs had to be cut and barges provided the cheapest ride.

This pattern held true during the general slump in 1954. Waterway traffic jumped from 75 billion to over 82 billion ton-miles. But when the economy snapped back, river commerce moved right with it. Over 97 billion ton-miles were logged in 1955 and last year saw another fat increase.

One reason why barge men are sharing in the current prosperity is that industry has moved to waterway sites with a rush. Four

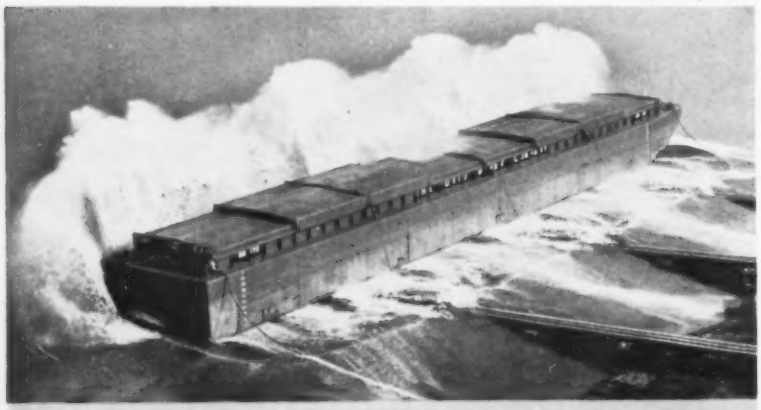
hundred and eighty multi-million dollar plants went up on waterfront acreage in 1955. Last year 570 waterway sites were staked out for industrial projects. In the Ohio River Valley alone, new plant construction came to $1.5 billion in 1956. Half a billion went into the area served by the Illinois Waterway system and Lake Michigan; Louisiana got $500 million worth of new plants, most of them on waterfront sites.

Moreover, industrial expansion has been spearheaded by industries that are traditionally big water shippers. Bulk materials are still the big barge items. Shipments of motor vehicles and parts have more than doubled since 1947. Over 300,000 tons of construction machinery moved by barge in 1955.

But the heavy tonnage is in loose solids and bulk liquids. Petroleum accounts for 35 pct of inland shipments; bituminous coal, 28 pct; construction materials, 13 pct; iron and steel products, 2 pct; chemicals, 2 pct.

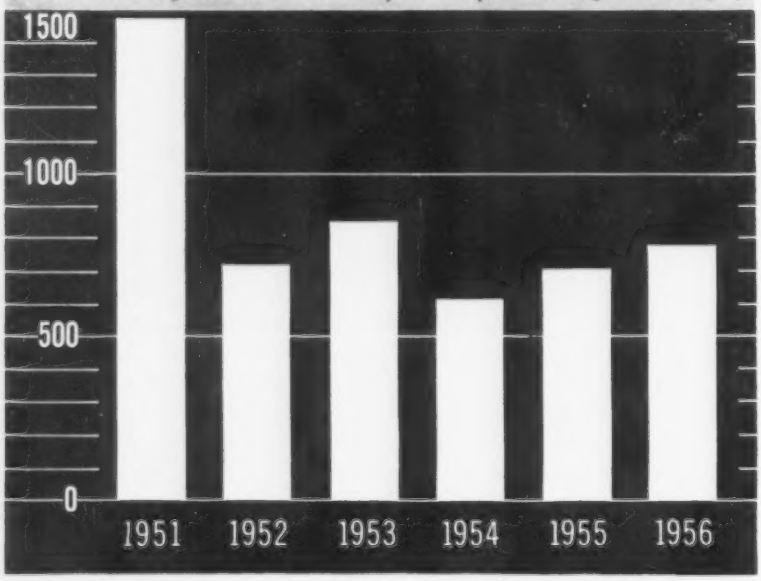
All these water-oriented industries are growing fast. Domestic crude oil production jumped 4 pct last year; bituminous coal output rose by 39.6 million tons. The sand and gravel industry increased production by 35 million tons; steelmaking capacity rose by 4 pct; chemical companies socked $1.5 billion into expansion.

Dravo Corp. Photo



More Hulls For Rivers And Canals

Annual launchings of inland waterway craft. (Includes tugs and barges)



Prime headache for all river operators today is the shortage of barges. Since 1951, over 5000 inland waterway craft have been launched. Last year 785 barges and boats were launched. More are urgently needed. Marine builders have the capacity to increase production. They turned out nearly 1500 barges in 1951. As this indicates, most are operating at about half their full capacity.

The snag is steel plate. Scarcity of plate has cut building to the point where one large builder says profits are drying up.

The yards are not particularly encouraged by backlogs that extend two years ahead. One builder doubts that there will be any new ordering for the next six months. He says barge operators work on short term commitments and stop ordering when lead time gets too long.

Assembly is Quick

Moreover a plentiful supply of plates would increase the building rate and cut backlogs in half overnight. Barges are largely of welded construction and are put together by assembly line techniques. A big builder like American Bridge can turn out four standard (175 ft) or two Jumbo (195 ft) barges in a week.

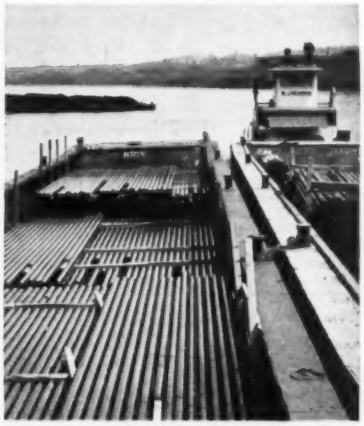
The barge builders have kept pace with the new operating requirements of their industry. Dravo Corp. goes over to Holland to test scale models in a special tank. Currently turning out over 100 barges a year, Dravo has pioneered steering and propeller techniques that have improved towboat handling.

Rates Are Factor

Bargemen, taking advantage of increased shipping activity, have been able to offer improved service plus lowest rates. It costs 45¢ per cwt to barge steel pipe from Pittsburgh to Houston. To this must be added about 10¢ a ton for handling. Cheapest rail rate before the recent hike was $1.10 per cwt. On the basis of figures developed from 1948 shipments by the Army Engineers, the

Ohio Valley Improvement Assn. estimates barge shipments yield savings that run from 1.84 mills per ton-mile for sulfur to 6.49 mills per ton-mile for scrap metal.

An important part of barge business was threatened recently when the railroads installed competitive rates to the Southwest. Rail freight on pipe to Houston from Pittsburgh dropped to 74¢ per cwt. These rates were ruled



Associated Photographers Photo

out last August by a Federal court. However, new hearings are underway and the matter will probably go to the Supreme Court.

Barge lines are conscious of the need to maintain low rates. They put through a 6 pct increase last May but have held the line since then, despite rising costs. Under their new labor contract the lines are granting progressively longer off-duty periods to barge hands. Eventually the lines will be giving one day off for every day underway. Rates are expected to go up —probably 5-6 pct—but not before March 15.

The big disadvantage of barges is their relative slowness. It takes about three weeks for a barge shipment to get from Pittsburgh to Houston. Railroads can make the same haul in about one week. For some shippers the cost edge of barges may offset the time loss. Other shippers require fast delivery and a third group swings back and forth, depending on market conditions.

Another problem is traffic jamups. On the Ohio River, where there was over 70 million tons of traffic in '55, congestion is mounting.

Change of Pace

The shifting relationship of cost and speed to this last group shows up in the experience of one Pittsburgh mill. During the last quarter of 1956, the mill shipped oil country goods to the Southwest by rail. Oil drillers were desperately pinched and were willing to pay the added freight to get fast delivery. Now the pressure has eased a little and the mill is going back to barge shipment.

There will always be a certain amount of this switching but barge lines feel a large percentage of their business has been placed on a permanent basis. They have taken great strides in the past 20 years to make barging more efficient and reliable.

Reprints of this article are available as long as the supply lasts. You may obtain a copy from Reader Service Dept., THE IRON AGE, Chestnut & 56th Sts., Philadelphia 39, Pa.

Industry's Use of Waterways Grows

Shipments in net tons—exclusive of Great Lakes

Commodity	1947	1955
Bituminous Coal	64,395,170	90,417,566
Building Cement	395,328	1,727,196
Crushed Limestone	.....	2,931,884
Nonmetallic Minerals and Manufactures	475,739	1,935,827
Iron and Steel	2,615,573	8,777,016
Aluminum Ores, Scrap	3,551	171,351
Copper Ore, Scrap	263,357	319,249
Construction, Mining Machinery, Parts	.....	317,818
Motor Vehicles, Parts	216,941	477,733
Industrial Chemicals	10,956	2,691,306

Trailer Allowance

Shippers who send products by rail in their own truck-trailers must be paid a reasonable allowance by the railroads, the Interstate Commerce Commission orders.

In a new ruling, the ICC defines a shipper-owned trailer as a "transportation instrumentality." The railroads must provide an allowance in lieu of pick-up and delivery service says the government agency.

The new definition reverses earlier ICC interpretation of these vehicles as merely containers. As such the trailers were not to be rented by the rail lines nor returned free when empty, though this policy was not applied.

New ruling is in a case involving the Chicago & Eastern Illinois R. R. Co. The road had proposed to allow shippers 18½¢ per 100 lb for providing their own trailers. While holding that the shippers are due an allowance, the ICC does not find the proposed amount "reasonable."

Change of Scene

F. Price Norris, Jr. has been appointed Director of the Iron and Steel Div. of the Business and Defense Services Administration, U. S. Department of Commerce.

A veteran of 30 years' experience in the steel industry, Norris is on loan to the BDSA from his position as Assistant to the Vice President of Allegheny Ludlum Steel Corp. in charge of sales.

In his governmental capacity he replaces Leonard T. Willison, of Jones & Laughlin Steel Corp., who has returned to that steel firm after serving with the BDSA since June of last year.

Little Wheels

The Carborundum Co. will construct a new plant in Van Wert, O., for the manufacture of high volume, small abrasive wheels. The facility is a major part of Carborundum's $30 million modernization and expansion program to be completed sometime in 1958.

The new installation will feature automatic production machinery housed in a total of 91,000 sq ft of floor space. Completion is expected late this year with operations scheduled for 1958.

BUSINESS

CREDIT: How Your Banker Looks At 1957

Tight money is only part of the problem . . . Bankers are a little pessimistic about business . . . You can expect closest scrutiny from your banker when you ask for a business loan—*By K. W. Bennett.*

◆ YOUR BIGGEST BATTLE in 1957 may be with a banker. Credit, tightening through 1956, will continue to tighten through first-half 1957.

Now a new note is entering the picture. Bankers, if the 1000 of them attending the recent American Banking Association are a representative sample, are quoting the phrase, "the boom is getting tired." And when booms get tired, bankers pull in their loans.

Borrowers seeking bank credit will need to justify their money requirements with a sharp pencil; be prepared in advance to meet these general arguments:

A loan on finished goods: Retailers and wholesalers have overbought to beat expected price rises. Though bankers do not regard inventories as dangerously high, their watchword is caution. Inventories rose 7 pct, a $5.5 billion increase to a total of $87.1 billion before the end of 1956 and year-end sales were not strong enough to justify this kind of inventory lay-a-away. Nothing more than a "pause in the rate of sales increase" would be enough to upset the delicate inventory-sales balance.

Loans for inventory buildup: Bankers have been warned that steel, copper, and aluminum inventories are either high or at least in balance. Generally, manufacturers' inventories of raw materials are regarded as better balanced than finished goods inventories, but finished goods at the manufacturing level are regarded as rather high.

Some bank officers are already speaking of "frozen inventory loans," where demand for the product held in inventory has fallen or disappeared entirely. It's being pointed out by some bankers that the business dropoffs of 1949 and 1953-54 were due largely to inventory reduction, particularly of finished goods and raw materials at the manufacturer level.

Loans for a new business: While the number of new business starts were at record levels last year, so were business failures. (Highest level in 15 years and 16 pct over the 1955 level.)

Banks sold off $3.5 billion of government securities last year to raise fresh capital, substantial quantities of which went into smaller businesses and agriculture. That capital was quickly absorbed and there isn't much left.

Examinations of the prospective beginning business man are more intensive. A loan officer will probably want personal background over several years, at least one year's experience in this line of business, some indication of sales ability, a personal financial statement, and other personal data.

Loan for an established small business: The old practice of walking into the bank with your assets listed on the back of a used envelope is out. Most loan officers will want to see tax returns, accounts receivable and payable as of the end of the most recent month. Even established customers are being turned down. Bankers don't like to lose the business, but admit they are having to do it. For one thing, they don't have enough cash.

For a loan to expand: Many production increases of 5-10 pct in 1956 brought no increase in profits. The banker has already put considerable capital into loans for plant expansion. He'll supply more, but he will require selling. Borrowing money to finance a merger or acquisition of another company is not an alternative.

Surveys of banker opinion (conducted by the Credit Policy Commission of the American Bankers Association) suggest that bankers expect tight credit but a strong level of business in 1957.

SBA Out Of Cash—Asks For More

▪ Money-starved small firms, flooding the Small Business Administration with requests for money, have about exhausted the agency's supplies of ready cash.

▪ President Eisenhower is asking Congress to refill the agency's coffers with another $50 million to finish out this fiscal year. He also wants the lawmakers to raise the present limit of $150 million in loans which SBA may have outstanding at any time. Congress is expected to go along.

▪ Tight money conditions and growing popularity of SBA's lending programs have brought businessmen to the agency for loans in record numbers over the past year.

SCRAP: It's Facing Up To A Problem

Industry takes bull by the horns in tackling growing problem of public relations . . . Smoke control laws pose big problem for scrap yard operators . . . Another good year in '57—By *J. B. Delaney.*

◆ THE IRON and steel scrap industry is facing up to a growing problem: public relations.

At the Institute of Scrap Iron & Steel's 29th annual convention at Miami Beach, public relations came in for a lot of attention. The 1200 delegates were indoctrinated in various phases of the PR problem facing the industry. These include relations with government, customers, employees, and the general public.

A session on incinerators pointed up the increasing number of communities that consider industrial smoke a nuisance. Laws restricting smoke density pose special problems for yard operators accustomed to burning automobile bodies in the open.

Leonard I. Abrams, Cleveland, chairman of the Institute's balers committee, predicted that incinerators would become as commonplace in an iron and steel scrap yard as shears, cutting torches, and presses.

Survey Encouraging

A workshop on public relations led by Jack Levand, chairman of the group's public relations committee, went into some of the mechanics of getting the industry's story across to the public.

A survey by Opinion Research Corp., Princeton, N. J., brought out that the overall impression of the industry is basically a favorable one. But Dilman Smith, vice president of ORC, pointed out that there is still a job to be done.

Mr. Smith told the delegates that the industry creates a favorable impression almost in direct proportion to the knowledge that people have of it. To support his point, the speaker said the special poll conducted for the Institute indicated that 17 pct of the public consider iron and steel scrap one of four industries they know most about. And 17 pct said it made the most favorable impression.

SCRAP Institute officers: Front row (l. to r.) Harry Marley, Syracuse, secretary; Milton K. Mahler, Detroit, second vice president; Leonard H. Krieger, Pittsburgh, president; Myron L. Chase, New York, first vice president. Back row: Samuel G. Keywell, Detroit, treasurer emeritus; E. J. Moskowitz, Jersey City, treasurer, Edwin C. Barringer, executive vice president. Mr. Krieger is serving his second term as president.

Delegates generally were optimistic over the outlook for the coming year. The few pessimists were only mildly so. In fact, it was hard for anyone to be pessimistic considering that the industry had just come through its biggest year. In 1956, some 36 million gross tons of purchased scrap were handled for domestic consumers. Another 5 million tons went into export. This compared with 34.5 million and 4.5 million, respectively, in 1955.

Leonard H. Krieger, Pittsburgh, Institute president, said the 1957 challenge to scrap is whether still more can be generated to meet expanding requirements of the steel industry and foreign nations.

Mr. Krieger also discussed the touchy subject of exports—something the steel mills are not too happy about.

"Of course, adequate support of domestic consumers always comes first. But if there is an exportable surplus—and the scrap industry is confident there is—then this country's wealth in raw materials, like its dollars, should be shared with friendly foreign nations to bolster their economies and build them up as a bulwark against Communism.

"It would be dangerous and uneconomic to place a rigid ceiling on exports for the reason that when domestic consumers recede from the market—as they often do—a commensurate increase in exports would keep intact the invaluable collection and preparation machinery."

PRODUCTION

FOUNDRIES: Price Squeeze Is On

Mounting costs are eating into profits . . . But industry is willing to absorb costs if volume stays high . . . Some hold back on expansion plans . . . No supply problems reported.

◆ THE WAGE-PRICE spiral is beginning to tell on foundry balance sheets.

From a volume standpoint, 1956 was one of the best peacetime years for the nation's foundries. But the prices they had to pay for labor, pig iron and scrap since last summer's steel strike are digging deep into net earnings.

Labor costs have gone up—particularly for steel foundries whose workers are covered by United Steelworkers' contracts. Cost-of-living clauses boosted wages another 3¢ an hour this month. If inflation continues, more cost-of-living increases are on the way.

How will the wage-price race affect the price fabricators have to pay for castings? For the immediate future, the price of foundry products are likely to remain stable.

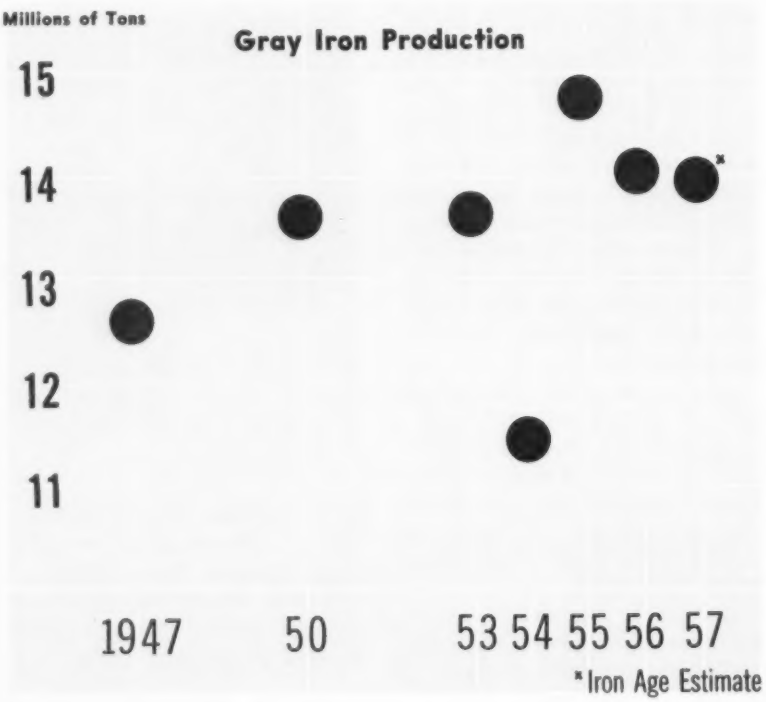
As long as volume continues high, most foundrymen are willing to absorb increased costs. And many have order backlogs of two to six months.

"Everybody seems to be buying castings," says one Philadelphia area steel foundryman, "and we're looking for another good year."

A southern New Jersey steel founder specializing in large auto body dies says, "We have a six-month backlog in orders and that's the most we've ever seen in this business."

While no one seems to be talking higher prices at the moment, some foundrymen say the industry should work toward a better pricing policy.

Those in a favorable competitive position did boost their prices last year. In the Pittsburgh district, for instance, prices of iron castings went up 7 to 12 pct on Oct. 1. Prices of steel castings went up about 10 pct on Aug. 1.



Both were based on wage increases.

But many foundries have to meet competition. To do so, they are absorbing some or all increased costs.

Because labor costs represent about 50 pct of a foundry's total operating costs, many are continually on the lookout for improved methods. Some foundries are going in strong for automatic core blowing machines, conveyors and other automatic equipment.

Yet with net earnings dwindling, many are reluctant to buy expensive new equipment.

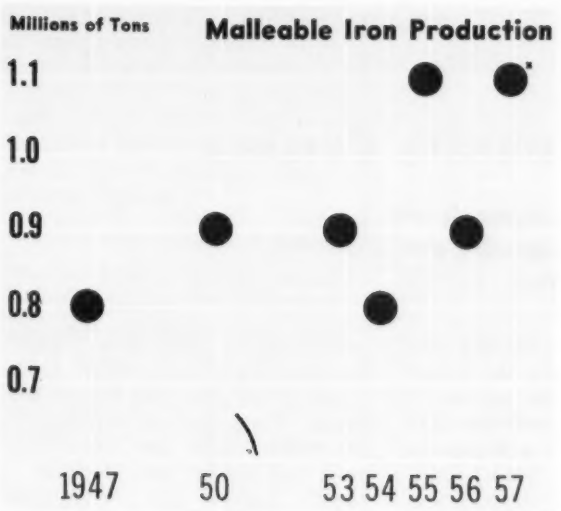
In the five foundry equipment categories listed by the Foundry Equipment Manufacturers Assn., only two showed better-than-average buying activity in the fourth quarter, 1956.

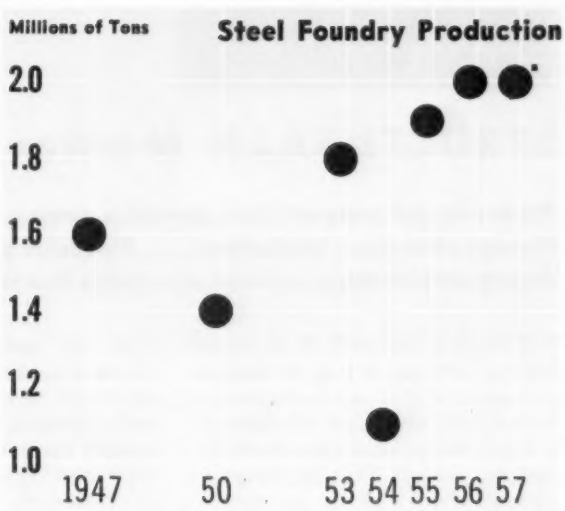
Orders for new furnaces and accessories are described as "very good." Material handling and processing equipment orders were "higher than average." But orders for blast cleaning and tumbling equipment, dust and fume collectors, and molding machines were "below average."

The supply picture: Most foundries are having no trouble getting all the pig iron, scrap, and other materials they need—with the exception of nickel. Those affected when Bethlehem Steel stopped selling pig iron have apparently found other sources of supply.

Here are foundry market conditions as reported from major districts:

Pittsburgh . . . Demand for castings has eased off a little here. This is regarded as a normal seasonal thing, stemming from year-





end inventory cuts. Still, some foundries have escaped the lag altogether.

Most Pittsburgh foundries are working five days a week. This is a normal rate. But if demand warranted, capacity could easily be expanded with extra shifts. However, there are soft spots.

Regarding the outlook, one foundryman points to a high rate of inquiries and looks for a quick pickup in business.

Chicago . . . Despite short backlogs and a mild January slump, Chicago area foundrymen are hopeful about first and second quarter prospects. In some cases, there is good reason for high hopes, with current business levels running as much as 15 pct over a year ago.

Others, who completed their best 1956 month in December, attribute the January downturn to inventory-taking by their customers.

Tonnagewise, ordering is fairly strong. The size of the individual order is smaller. The customer is specifying fast delivery and is ordering more frequently. This is interpreted as an attempt by customers to hold down castings inventories.

It is particularly true of gray iron. This has reduced the average foundry's work backlog to about three weeks. Nonetheless, volume holds high.

Philadelphia . . . Steel foundries are faring especially well in this area. Four large steel foundries report that 1956 was one of their best peacetime years from a volume standpoint. Order backlogs are high. One company in the automotive field says it is booked up for six months.

This same foundry is getting in a new furnace and crane this year. Another is installing several new sand silos and a conveying system for speeding up sand handling. A third has expansion plans, but is pulling back its reins because high costs are cutting into profits.

"Our own prices have been raised during the past year, but they are still lagging behind cost increases," says the plant manager. "We're waiting to see how things shape up in the next month or so before we go ahead and buy new equipment."

Detroit . . . Foundry business appears spotty. Depending on whom you talk to, business is both good and bad.

But the general opinion is that the outlook for business in 1957 is good. Earnings have been fair to good for 1956 and everybody looks looks for '57 to equal last year.

Part of the cost increases have been passed on to consumers and various foundries in the area are cutting corners as much as possible to get business.

In order to avoid a profits squeeze, some foundries have been concentrating on specialties. Competition in regular gray iron castings gets rougher every day.

Cleveland . . . Increasing tonnages shipped to smaller, miscellaneous customers are helping to keep volume high. The foundry business outlook is suffering from early fog. But some quarters expect the strongest markets this year to be automotive, railroad car building, construction, farm, and road machinery.

Cost of raw materials continues to go up here. Many foundrymen can see the floor pushing them against the ceiling. Pig iron has had sporadic increases with more on the way. Scrap is only slightly off record highs. Most foundrymen are looking for a good first half in 1957.

West Coast . . . How well Pacific coast foundries do in 1957 depends a lot on the scrap market. Heavy scrap export to Japan is raising havoc with them. If foundrymen can get enough of what they need at realistic prices, they'll do well this year.

IRON AND STEEL FOUNDRY PRODUCTION TOTAL (in thousands of tons)

1947	1950	1953	1954	1955	1956*	1957*
15,284	16,148	16,513	13,538	17,800	17,059	17,100

* Estimate

MANUFACTURING

STRUCTURALS: Market Stability Coming

Producers and users will both benefit in coming years as supply and demand come more into balance . . . Producers push expansion amid signs that demand will increase . . . Light structurals demand grows.

◆ THERE'S PROSPECT of firmer market footing for both producers and users of plate and structurals in the next five years. Producers see the current demand continuing and increasing. They're planning and building capacity to satisfy it. Users can look ahead to obtaining more product.

Briefly a new stability has arrived in the market for heavy steel. New production techniques and new markets for products promise to bind supply and demand closer together in the future.

In the past the market for plates and structurals has moved in erratic jerks. After periods of peak demand, the railroads cut freight car orders to a trickle in 1949 and again in 1954. Shipbuilders were idling along in low gear only a few months before the Suez crisis triggered the current tanker push. Linepipe production, which takes big quantities of plate, ground to a complete halt for three months in 1954.

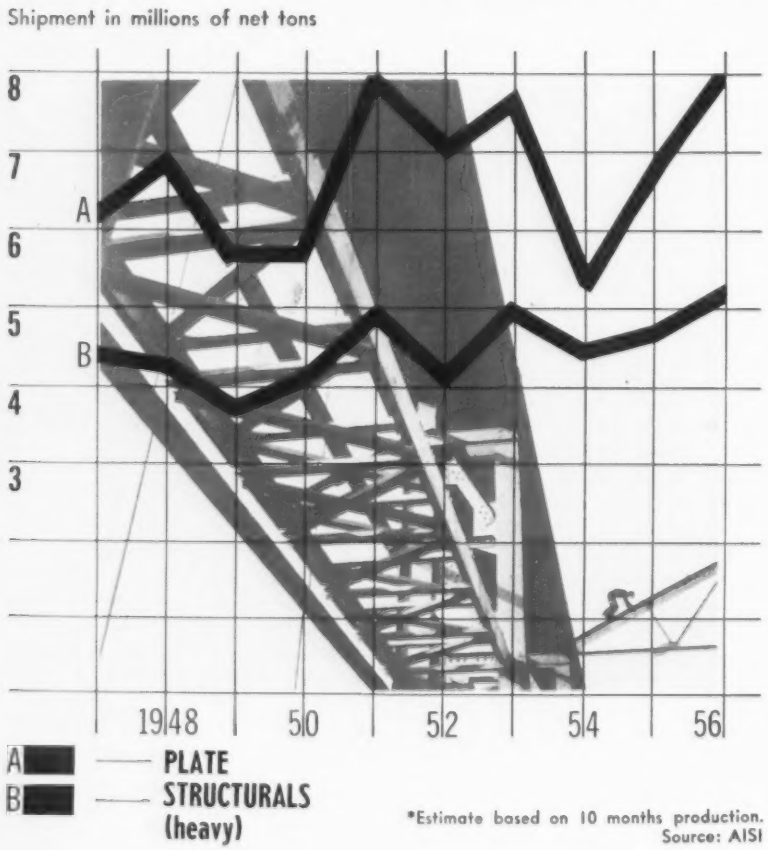
The mills remember these dull days but they feel the current spurt has more stamina than its predecessors. They hear freight car building will top 60,000 units annually for the next five to ten years. They know linepipe mills are booked solidly into 1960. They read that oilmen have lined up a tanker program that extends into 1961 and calls for fleet capacity to be doubled.

On top of this, are the big backlogs of machinery builders, the steady pace of construction and the long range highway program. With these gilt-edged facts to go on, the mills began a while back to mount their first large-scale expansion of heavy steel since World War II.

In 1955, Inland Steel installed a wide flanges structural mill at Indiana Harbor. This was the first of this type in over 10 years.

U. S. Steel is currently installing a structural mill at South Chicago. The corporation's plate and structural mills are due for large shares of added steel to be produced at Pittsburgh (670,000 tons) and Chicago (1.3 million tons).

Will Plate, Structural Demand Stay High?



Expansion Plans

Bethlehem Steel will begin to install a 160 in. plate mill at Sparrows Point, on Feb. 1. At the same location, new openhearths will add 2 million tons to steelmaking capacity by next January. At Bethlehem, Pa., the same mill has increased production of a structural mill from 140,000 tons a month to a current rate of 190,000 tons a month.

In addition there are a number of large projects hanging fire. U. S. Steel is considering spending $17.8 million for steel plate at Chicago. Bethlehem has earmarked $250 million for Lackawanna, part of which is scheduled to go to plate and structural facilities. Armco Steel is tentatively

planning to spend $100 million at its Houston works (Sheffield Div.), which is a big plate producer.

Lukens Steel, which specializes in plate, is now looking for cash to support a $40 million expansion. Phoenix Iron & Steel Co. also is expansion-minded.

No Change in Plans?

The mills have not revealed the status of these major programs. Some were highly tentative, even if fast tax privileges had been granted. But it is almost certain that a portion of the discussed project will go forward.

A good amount of the new construction will probably be designed for lighter structurals.

There's a growing demand for them. U. S. Steel, Bethlehem, and Inland are all rolling light beams and joists on their big mills. Jones & Laughlin offers its junior channels and junior beams, which are light weight, copper-bearing structurals.

The New Look

New design techniques and new steels are partly responsible for this trend. High-strength low alloy steels are finding wide use in bridge construction and other applications. In New York City, the building code has reduced the minimum thickness for copper bearing steel from 1.50 in. to 1.35 in.

More important than these developments is the trend to light occupancy buildings. For low slung shopping centers, garages, schools, and the like, the lighter beams are being widely used as roof purling and floor joists.

And the need for this type of construction is nowhere near satisfied.

In line with this trend, producers are adapting large mills to lighter work. U. S. Steel at its Homestead works has installed new runout tables and related equipment to handle smaller structurals, for example.

On the question of making plates and structurals more profitable, one producer sees no radical changes in pricing coming. In lean times, he indicates, customers stop talking about being willing to pay higher prices if they could be sure of supply.

MANUFACTURING

PRODUCTION: More for Less

Production will double in next 20 years . . . But workers will put less time on the job . . . Production forum shows how these goals will be reached through new techniques.

	1899	1929	1949	1956	1966	1976
Workers (millions)	5.0	9.3	12.3	13.6	14.8	15.6
Hours Per Week	59.0	44.2	39.2	40.3	37.3	34.9
FRB Index	17.0	59.0	97.0	142.0	201.0	281.0
KWH Per Worker	295	6,855	13,406	21,110	36,000	61,300

This is a General Electric Projection

◆ THERE'S NOT MUCH DOUBT that U. S. industrial production will double in the next 20 years—even while the drive for a shorter work week gains momentum.

How to meet these demands on productivity is one of the biggest problems confronting industry. Some of the answers to improving production through new developments and techniques are found in a series of industrial productivity forums sponsored by General Electric Co. and public utilities.

More than 400 industrialists attended the 100th forum of this continuous series at Newark, N. J. It was co-sponsored by the Public Service Electric & Gas Co., a New Jersey utility. In the seven-year period, over 20,000 industrialists have attended the forums in 31 states.

Top GE executives, specialists in their fields, outlined new developments, discussed advances that are being made and will be made to solve the problem of productivity. Here are some capsule comments:

Dr. L. T. Rader, general manager, Specialty Control Dept.—"These are the tools that are bringing . . . 1976 into focus:

"Computers which are . . . helping eliminate the costly and time-consuming communication barriers between engineering concept and finished product.

"Product controls which store information and provide error-free automatic guidance to industry's machines.

"Adjustable speed drives speeding and coordinating material handling and machine processing.

"Photo electric and other visual tools. . . . Only automatic electronic inspection and quality control can stay with the production line speeds of tomorrow."

Frank J. Barnes, marketing manager, Industrial Television Dept.—"I believe that well before 1976, industrial TV will be an every day tool of American industry. Before that year rolls around, 'slow scan,' the newest development in television will have been introduced. . . . Slow scan is accomplished by transmitting one image every four or five seconds instead of the usual 30. The slow-scan picture can be transmitted over a telephone voice line."

J. J. W. Brown, manager, Application Engineering Materials Handling—"By 1976, materials handling, as a separate entity of the manufacturing process, will probably lose its identity. . . . Today's methods will have been incorporated into the automation picture; materials will be received at one end of the plant, flow continuously through the manufacturing process and out the shipping door."

MARKETING

WAREHOUSES: Hunt Capital Goods Items

Most items are in good supply . . . But products used in capital expansion programs are tight and will stay that way . . . Nickel shortage creates problem for stainless and some alloys— By G. G. Carr.

◆ "THERE IS NO shortage of steel today — except for those items used in capital goods expansion programs." So says Robert Welch, executive secretary, American Steel Warehouse Assn. He summed up the warehouse steel picture at a special meeting in New York late last week.

He and other industry executives stress that warehouse stocks of bars, flat-rolled, including light plates, tubing, tool steel and most alloy and stainless steels are ample. But they concede some spot shortages. Scarce or virtually nonexistent are heavier plate, structurals, oil country goods, seamless pipe. Steel mill deliveries are current on most other items, as are deliveries of other metals regularly stocked by warehouses.

Structurals Pinch

Because of this, warehousemen find inventories in their customers' plants in good balance to current production schedules. But they stress that they see no repetition of 1954, when fabricators' inventories slowed new steel sales to a trickle for several months.

On a product basis, structurals are the scarcest. Warehouse inventories are virtually nil, reports George L. Stewart, president, Jones & Laughlin Steel Warehouse Div. And the situation is "on the way to getting worse before it gets better." Despite some new structural capacity, Mr. Stewart does not look for any improvement in inventory for some months, and perhaps not for the entire year.

Plate Picture

Plates follow the structural pattern, with the exception of light plate (under ½ in. thick), according to C. L. Hardy, president, Joseph T. Ryerson & Son, Inc. Mr. Hardy expects warehouse plate receipts this year to be slightly under 1956.

Both hot and cold bars are now generally in good supply, reports Robert J. Heggie, vice-president, A. M. Castle & Co. Although there are a few spot shortages of some grades and sizes, inventories overall are at least normal. Sales outlook: good but competitive.

The nickel problem continues to shadow the stainless steel picture, warns Lester Brion, chairman, Peter A. Frasse & Co. This is particularly true of high-nickel plates and sheets. And price advances may cost the stainless industry some customers.

The low-nickel grades, particularly the 200 series, are not selling well at the warehouse level, Mr. Brion comments. He believes that the best customers for these grades are predominantly mill tonnage users, such as manufacturers of trim for railroad cars. Large warehouse customers, on the other hand, like aircraft, chemical and food industries, must of necessity have the high-nickel grades.

Generally, warehouse stainless inventories are fairly good, in the face of strong customer demand. But mill deliveries vary widely, depend on availability of billets for processing. Sheet deliveries are from 10 to 20 weeks, while bar, wire and shapes run anywhere from 4 to 20 weeks. Tubing deliveries also cover a wide range of 3 to 20 weeks.

Tubing Varies

Deliveries of mechanical tubing, both carbon and alloy, also vary greatly from mill to mill, Mr. Brion reports.

Alloy steel warehouses still suffer from lack of heat treating facilities at the steel mills, says F. H. Lovejoy, president, Wheelock, Lovejoy & Co. Warehouse demand for heat-treated steel is rising, but lack of equipment at the mills has resulted in some delays. But mills are current in shipments of untreated alloy.

Nickel shortage is still a headache, and some customers have given up entirely on grades like 46-15 and 46-40, switched to lower nickel grades.

Flat-rolled products of all kinds are in more than good supply, states M. R. Lowenstine, Jr., vice-president, Central Steel & Wire Co. There is some question whether first half '57 will equal first half '56, but business should still be healthy.

Why Warehouses Will Get Less Plate Tonnage

C. L. Hardy, Ryerson president, explains:

1. Increased military setasides, spurred by larger defense appropriations in the new budget.

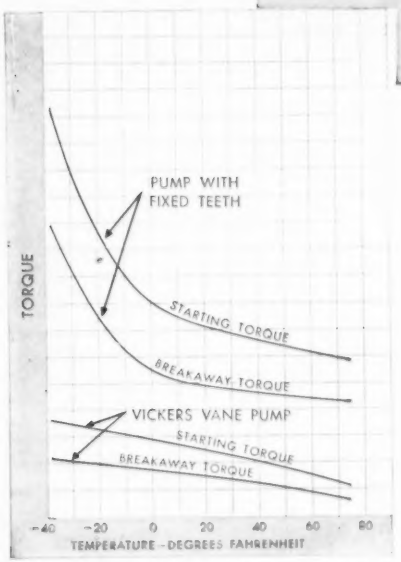
2. Increased voluntary allotments for freight car and shipbuilding programs.

3. Increased use of plates by steel mills for their own expansion.

4. Temporary loss of production in the East due to scheduled two-month shutdown of Bethlehem's existing mill at Sparrows Point while a new mill is brought in.

MUCH EASIER COLD WEATHER STARTING

Sno-Cat (without body) undergoing tests in extreme cold in the Pyrenees mountains preparatory to being used by French scientific expedition at the South Pole. Sno-Cats will also be used by the U.S. Navy and British Expeditions to the Antarctic.



Curves based on comparative tests of a Vickers Balanced Vane Type Pump and an equal capacity pump with fixed teeth. Oil used in both was SAE 10W premium grade.

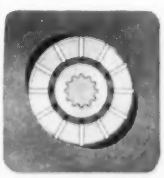
Another Reason Why TUCKER SNO-CATS have VICKERS® Balanced Vane Pumps

The Sno-Cat operates where it is really cold . . . high in the mountains . . . with U. S. Navy, French and British Expeditions in the bitter wastes of the Antarctic . . . wherever snow is so deep that wheel vehicles fail.

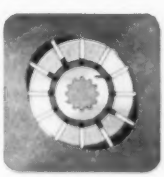
Like many other vehicles that must operate in cold weather, the Sno-Cat uses a Vickers Vane Pump to avoid the extra starting handicap that would be imposed by a hydraulic pump with fixed teeth or spring-extended vanes. In extremely low temperatures such a pump seriously increases starting load over normal (see curves at left) . . . at a time when the cold has substantially reduced the power of the starting battery. The diagrams below at the left show why Vickers Vane Pumps provide much easier cold weather starting.

All Tucker Sno-Cats use a Vickers hydraulic power steering system. In addition to the pump, these systems include a steering booster, a volume control, and overload relief valve.

Any vehicle which must operate in cold weather needs a hydraulic pump that provides "no-load starting". Let us tell you more about it . . . and about the many other reasons for using Vickers Balanced Vane Pumps.



Schematic diagram of Vickers Balanced Vane Type Pump showing how sliding vanes are retracted at normal engine cranking speeds. No oil is pumped and there is practically no starting load.



Similar diagram shows how pump vanes are extended when engine fires. Pumping then begins and continues at all engine speeds (vanes are held in intimate contact with cam ring by system pressure in addition to centrifugal force).

VICKERS INCORPORATED

DIVISION OF SPERRY RAND CORPORATION

ADMINISTRATIVE and ENGINEERING CENTER

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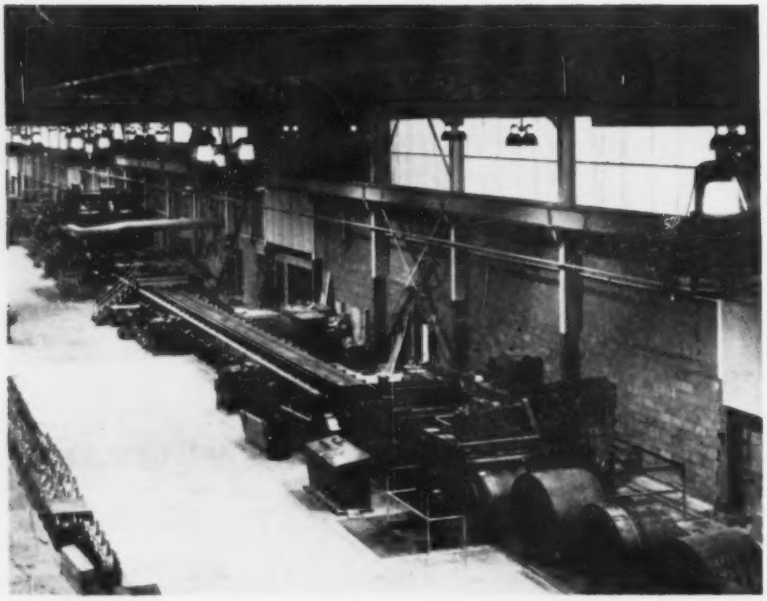
Vickers Balanced Vane Type Pumps for mobile equipment are available in five basic sizes having 15 normal delivery ratings and a variety of mountings. Other advantages include: high efficiency, automatic wear compensation, hydraulic balance, dependability and long life. Write for Catalog M-5101.

7376

ENGINEERS AND BUILDERS OF OIL HYDRAULIC EQUIPMENT SINCE 1921

EXPANSION IN INDUSTRY



DESIGNING the automatic controls for the new Alberta Phoenix welded pipe plant proved to be a monumental undertaking. A single connection-wiring diagram measured 3 ft x 19 ft. The two control drawings were 34½ ft in length. The project was handled by engineers at Reliance Electric Co.

Canada Pipe:

New plant features one man automatic controls.

Over 100,000 tons of welded pipe for western Canada oil and gas fields will be turned out each year by the new $6.5 million plant of Alberta Phoenix Tube & Pipe, Ltd., at Edmonton, Canada.

Unusual features are the automatic controls, developed by Reliance Electric, permitting the mill to be operated by one man. The completely integrated, all-electronic system boasts over 6000 interconnecting conductors.

A flying cut-off saw with a length-measuring digital generator spurs more accurate cutting on the fly. The material is not touched by any worker from the time it enters the line until it is loaded for shipment.

Initial planning for the new plant began in 1955. Production in the finished installation began 12 months after the start of engineering, nine months after the ground was broken, and five months after the first steel was erected.

Product And Production

Normal production speed of the mill is 80 fpm. In terms of .237 in. gage skelp, it means 80 tons per hour of 12¾ in. o.d. skelp.

Sizes range from 3½ in. o.d., .015 in. wall thickness to 12¾ in. o.d. with .375 in. gage. Running lengths are from 16 to 60 ft.

Plant general manager is E. W. Gommel, formerly with Consolidated Western Div., U. S. Steel Corp.

Expansion Briefs

Stackpole Carbon Co., Electronic Components Div., St. Mary's Pa.; placed in service one of the world's largest Globar-equipped, car-bottom kilns; designed and built by Harper Electric Furnace Corp., Buffalo; for high temperature calcining of conductor material for fixed composition resistors.

Dana Corp., Parish Pressed Steel Div., Reading, Pa.; increasing automotive frame production by 40 pct.

Texas Eastern Transmission Corp., Shreveport, La.; additional pipelines and facilities; cost about $241,000.

Bollier-Damerell, Inc., Niagara Cutter Div., N. Tonawanda, N. Y.; adding 6000 sq ft to its facilities; for production of cutting and boring tools.

Hupp Corp., Perfection Industries Div., Cleveland; building new 28,000 sq ft warehouse, Waynesboro, Ga.; storage of heaters and furnaces made by the company.

Caterpillar Project

Caterpillar Tractor Co., Peoria, Ill., will build a new industrial engine plant, new research center and new general office building on a 1100 acre site north of Peoria.

Project is part of an overall building program which will cost $200 million over the next three years.

Site preparation for the engine plant is scheduled to begin within the next few months. Other programs are still in the planning and engineering stages.

Operations in the new area are scheduled to begin late in 1958 or early 1959. V-type engines up to 650 hp will be produced.

SPEED NUTS® WITH A HANDLE

eliminate fastener fumbling!

Multiple-unit strips of Tinnerman Flat-Type SPEED NUTS permit cost-cutting, split-second fastening. That's how Reznor Mfg. Co., Mercer, Pa., saves up to 40% in the assembly of louvers for its Suspended Gas Unit Heaters!

With strip in hand, the operator drives a screw into the end SPEED NUT, easily snaps off the tightened fastener from the strip and quickly places the next SPEED NUT in screw-receiving position. No lost motion feeling or fumbling for single fasteners, spanner or lock washers. Louvers are securely fastened, and are easily adjusted to control air distribution.

This is an example of the versatility of SPEED NUTS. It is also an example of the assembly advantages of SPEED NUT brand fasteners. Over 8000 types give you an answer to almost every fastening problem. See your Tinnerman representative or write for complete details.

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Canada: Dominion Fasteners, Limited, Hamilton, Ontario. Great Britain: Simmonds Aerocessories, Limited, Treforest, Wales. France: Simmonds, S. A., 3 rue Salomon de Rothschild, Suresnes (Seine). Germany: Hans Sichinger GmbH "MECANO", Lemgo i. Lippe.

➔ Take a long look into the future. You'll see constantly growing industrial activity and millions of tons of *power-packed* Bituminous produced to sustain it, with *billions* still in reserve! B&O is a keystone to this vital supply and demand. The coal fields it serves hold proved, usable reserves of billions of tons of Bituminous for every purpose.

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COAL TRAFFIC DEPARTMENT B&O RAILROAD
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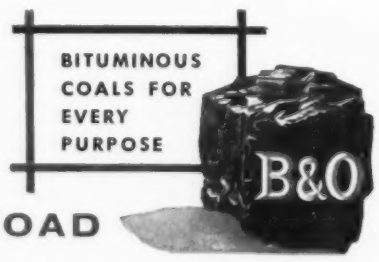

BALTIMORE & OHIO RAILROAD

Steel Capacity

◆ Steel industry spent $1.2 billion in 1956 to raise capacity to 133.5 million tons, an increase of 5 million tons. Another $1.7 billion will be spent for mills and equipment in '57.

◆ Industry faces problem of financing new construction. Battle for revision of depreciation tax laws continues. But Treasury Secretary Humphrey's comments are not too encouraging.

◆ THE STEEL industry's latest wave of expansion spending is beginning to bear fruit. Signs are increasing that supply and demand are coming into closer balance. Last year's 5 million tons of new capacity was just a starter. The mills have earmarked a record $1.7 billion for expansion and modernization in 1957.

In the last six years, average yearly expansion has been over four million tons. Capacity rose from 108.6 million tons in 1952 to 133.5 million on Jan. 1. This is an increase of 24.9 million tons, or about 24 pct.

But there are a few shoals ahead. One of them is financial. The mills are up against (1) increasing wage and material costs, and (2) rising demand for all steel products—over the long haul. Temporary dips in demand for some steel products do not affect long-range expansion planning.

Inflation complicates the mills' financing problem. But it's a good weapon in their running battle against present tax depreciation policies.

Chicago Top Gainer

During 1956, capacity went up 4 pct. That is, from 128.4 million tons to 133.5 million tons. Openhearth capacity went up 4.6 million tons, and electric furnace capacity rose 783,000 tons. Bessemer capacity dropped—from 4.8 million tons to 4.5 million tons.

The Iron Age breakdown of figures compiled by American Iron and Steel Institute showed that Chicago gained 1,092,000 tons. Next biggest gainer was the West, with 754,000 tons. The Valley (Youngstown) picked up 634,000 tons.

Cleveland jumped 584,000 tons; Southern Ohio River 554,000 tons; and Pittsburgh, 371,000 tons.

Blast furnace capacity rose 1.3 million tons to 86.8 million tons. Coke ovens of the industry are now able to turn out 72.9 million tons, up 1.5 million tons.

AISI reports the industry last year laid out over $1.2 billion for expansion and new equipment. This year's $1.7 billion will be a 42 pct increase.

Says AISI:

More To Come

"Moreover, the industry will have to continue spending heavily for years to come. The companies—large, medium, and small—are planning programs beyond 1957.

"The problem of finding funds for expansion and financing the stay-even requirements in the iron and steel industry is a most serious one. Inflation has greatly increased the costs of construction and new equipment in recent years. Because of the inadequate amounts recovered from depreciation, there has been a heavy drain on profits to replace obsolete facilities."

The industry's chances of getting tax relief in the near future does not appear too bright. At least, that's the impression given by Treasury Secretary George Humphrey. At a Budget press conference, Mr. Humphrey said the Administration reviews its regular tax depreciation policy regularly, but "I don't think any great big changes are coming."

IRON AGE DISTRICT CHANGES AT A GLANCE

District	Pct of U. S. Capacity		Increase in Capacity		Pct of U. S. Increase
	1957	1956	Net Tons	Pct	
Chicago	19.74	19.67	1,092,000	4.3	21.4
Pittsburgh	17.79	18.21	370,750	1.6	7.3
Philadelphia	13.15	13.48	248,010	1.4	4.9
Valley	11.24	11.20	633,620	4.4	12.4
West	7.33	7.03	754,330	8.4	14.8
Buffalo	5.41	5.46	200,000	2.9	3.9
Cleveland	5.11	4.86	584,000	9.4	11.5
Detroit	5.07	5.27	–20	N.C.	N.C.
South Ohio River	4.19	3.93	554,450	10.2	10.9
South	4.14	4.22	85,000	1.6	1.7
Upper Ohio River	4.00	3.95	270,000	5.3	5.3
St. Louis	2.19	2.05	295,000	11.2	5.8
Northeast	0.64	0.66	8,920	1.0	0.2
Total	100.00	100.00	5,096,060	4.0	100.0

The **IRON AGE**

Official Steel Ingot Capa

Ingot Capacity by Districts

DISTRICT—COMPANY	Rated Annual Capacity—Net Tons				
	1957	1956	1955	1954	1953
CHICAGO					
Alco Products, Inc.	.....	.....	.....	78,000	78,000
American Steel & Wire Div.	973,000	973,000	973,000	973,000	918,000
Borg Warner Corp.					
Chicago	100 000	100,000	100,000	100,000	.....
New Castle, Ind.	64,000	64,000	64,000	64,000	64,000
Total	164,000	164,000	164,000	164,000	64,000
Columbia Tool Steel Co.	6,600	6 600	6,600	6,600	6,600
Continental Steel Corp.	420,000	394,000	394,000	394,000	394,000
A. Finkl & Sons	33,600	33,600	33,600	36,600	33,000
Inland Steel Co.	5,500,000	5,200,000	5,000,000	4,700,000	4,500,000
International Harvester Co.	1,200,000	1,000,000	1,000,000	1,000,000	1,000,000
Joslyn Mfg. & Supply Co.	37,500	37,500	37,500	37,500	37,500
Northwestern Steel & Wire Co.	825,000	825,000	825,000	825,000	825,000
Republic Steel Corp.	1,392,000	1,232,000	1,232,000	1,232,000	1,232,000
United States Steel Corp.*					
Gary	7,204,000	7,204,000	7,196,000	7,117,000	6,593,000
South Works	5,441,000	5,441,000	5,470,000	5,470,000	5,016,000
Total	12,645,000	12,645,000	12,666,000	12,587,000	11,609,000
Youngstown Sheet & Tube Co.	3,144,000	2,738,000	2,676,000	2,656,630	2,103,500
TOTAL Chicago District	26,340,700	25,248,700	25,007,700	24,588,700	22,800,600
PITTSBURGH					
Allegheny Ludlum Steel Corp.	746,700	746,700	746,700	746,700	746,700
Alco Products, Inc.	105,160	105,160	103,000	103,000	103,000
American Steel & Wire Div.	1,015,000	1,015,000	1,015,000	1,015,000	900,000
Armco Steel Corp.	547,000	543,000	499,000	499,000	474,000
Babcock & Wilcox Tube Co.	229,450	229,450	229,450	229,450	229,450
Bethlehem Steel Co.	2,330,000	2,330,000	2,330,000	2,280,000	2,100,000
Braeburn Alloy Steel Corp.	20,730	20,730	20,730	20,730	20,730
Byers, A. M. Co.	90,000	90,000	75,000	75,000	75,000
Colonial Steel Co.	30,000	30,000	30,000	30,000	29,820
Crucible Steel Co.	1,356,000	1,356,000	1,284,000	1,284,000	1,284,000
Edgewater Steel Co.	117,600	117,600	89,890	89,890	89,890
Firth Sterling, Inc.	20,040	20,040	20,040	20,040	20,040
Heppenstall Steel Co.	55,550	55,550	55,550	55,550	55,550
Jessop Steel Co.	35,740	33,490	33,490	33,490	33,490
Jones & Laughlin Steel Corp.					
Aliquippa	1,900,000	1,764,000	1,764,000	1,764,000	1,764,000
Pittsburgh	3,300,000	3,097,500	3,097,500	3,097,500	3,337,500
Total	5,200,000	4,861,500	4,861,500	4,861,500	5,101,500
Latrobe Steel Co.	24,000	24,000	24,000	24,000	24,000
Mesta Machine Co.	105,000	105,000	105,000	105,000	105,000
National Tube Div.	1,446,000	1,446,000	1,446,000	1,446,000	1,224,000
Pittsburgh Steel Co.	1,320,000	1,320,000	1,404,000	1,404,000	1,320,000
Union Electric Steel Corp.	26,760	26,760	26,760	26,760	26,760
Universal-Cyclops Steel Co.	70,160	70,160	70,160	70,160	70,160
United States Steel Corp.*					
Clairton	1,064,000	1,064,000	1,064,000	1,064,000	947,000
Duquesne	1,521,000	1,503,000	1,462,000	1,462,000	1,735,000
Edgar Thompson	2,179,000	2,179,000	2,179,000	2,179,000	2,090,000
Homestead	4,043,000	4,035,000	3,766,000	3,570,000	4,406,000
Johnstown	25,000	25,000	25,000	25,000	25,000
Vandergrift	.....	.....	.....	275,000	275,000
Total	8,832,000	8,806,000	8,496,000	8,575,000	9,478,000
Vanadium-Alloys Steel Co.	12,000	12,000	12,000	11,910	11,910
Vulcan Crucible Steel Div. (H. K. Porter, Co., Inc.)	9,600	9,600	9,600	9,600	9,600
TOTAL Pittsburgh District	23,744,490	23,373,740	22,988,870	23,915,780	23,532,800

* Central operations.

DISTRICT—COMPANY	Rated Annual Capacity—Net Tons				
	1957	1956	1955	1954	1953
PHILADELPHIA					
Alan Wood Steel Co.	800,000	625,000	625,000	625,000	625,000
Armco Steel Corp. (Rustless Iron & Steel Div.)	102,000	102,000	102,000	102,000	102,000
Baldwin-Lima-Hamilton Corp.	169,960	169,960	169,960	169,960	169,960
Bethlehem Steel Co.					
Bethlehem	3,750,000	3,500,000	3,214,000	3,214,000	3,148,000
Sparrows Point	6,200,000	6,200,000	6,200,000	5,750,000	5,400,000
Steelton	1,500,000	1,500,000	1,356,000	1,356,000	1,312,000
Total	11,450,000	11,200,000	10,770,000	10,320,000	9,860,000
Carpenter Steel Co.	86,600	73,700	85,800	85,800	85,800
Claymont Steel (C. F. & I.)	499,500	499,500	499,500	494,570	494,570
Henry Disston & Sons, Inc. (H. K. Porter Co., Inc.)	.....	25,000	25,000	25,000	25,000
Eastern Stainless Steel Co.	50,000	50,000	32,000	32,000	32,000
Harrisburg Steel Corp.	100,750	100,750	100,750	100,750	100,750
Lukens Steel Co.	750,000	750,000	750,000	750,000	675,000
Midvale-Heppenstall Co.	163,350	325,000	347,100	353,370	324,950
Milton Steel Products Div. (Merritt-Chapman & Scott)	90,000	90,000	67,000	43,000	53,700
Phoenix Iron & Steel Co. (Barium Steel Corp.)					
††Harrisburg	486,760	490,000	406,000	406,000	406,000
**Phoenixville	360,000	360,000	432,000	432,000	432,000
Total	846,760	850,000	.....	.....	.....
J. A. Roebling's Sons Co. (C. F. & I.)	235,000	235,000	235,000	235,000	236,000
United States Steel Corp.	2,200,000	2,200,000	2,200,000	2,200,000	1,200,000
TOTAL Philadelphia District	17,543,920	17,295,910	16,847,110	16,374,450	14,821,730
VALLEY (Youngstown)					
Copperweld Steel Co.	660,000	618,380	618,380	618,380	618,380
Damascus Tube Co.	.....	.....	.....	1,800	1,800
Empire Steel Co.	500,000	500,000	500,000	455,000	455,000
Industrial Forge & Steel, Inc.	48,600	48,600	48,600	48,600	48,600
Mesta Machine Co.	26,000	.....	.....	.....	.....
Republic Steel Corp.					
Canton	1,315,000	1,125,000	1,125,000	1,125,000	1,125,000
Massillon	620,000	620,000	620,000	620,000	620,000
Warren	1,000,000	900,000	900,000	900,000	900,000
Youngstown	2,189,000	2,142,000	2,142,000	2,142,000	2,142,000
Total	5,124,000	4,787,000	4,787,000	4,787,000	4,787,000
Sharon Steel Co.					
Farrell	1,305,000	1,170,000	1,000,000	1,000,000	1,000,000
Lowellville	593,000	593,000	550,000	550,000	550,000
Total	1,898,000	1,763,000	1,550,000	1,550,000	1,550,000
Timken Roller Bearing Co.	700,000	700,000	648,000	648,000	625,000
United States Steel Corp.	2,943,000	2,943,000	2,943,000	2,943,000	2,734,000
Youngstown Sheet & Tube Co.					
Brier Hill	1,388,000	1,248,000	1,176,000	1,182,000	1,182,000
Campbell	1,728,000	1,764,000	1,668,000	1,662,000	1,662,000
Total	3,096,000	3,012,000	2,844,000	2,844,000	2,844,000
TOTAL Valley District	15,005,600	14,371,980	13,938,980	13,895,780	13,663,980

†† Previously reported as Central Iron & Steel Co.

** Formerly only capacity reported for Phoenix Iron & Steel Co.

pacities By IRON AGE Districts

Source:
American Iron and Steel Institute

DISTRICT—COMPANY	Rated Annual Capacity—Net Tons				
	1957	1956	1955	1954	1953
WESTERN					
Bethlehem Pacific Coast Steel Co.					
Los Angeles	478,000	452,000	402,000	402,000	402,000
San Francisco	276,000	252,000	252,000	252,000	252,000
Seattle	246,000	246,000	246,000	246,000	246,000
Total	1,000,000	950,000	900,000	900,000	900,000
Cabot Shops, Inc.	14,500	12,000	12,000	550,000	.....
Cameron Iron Works	58,800	58,800	58,800	58,800	58,800
Colorado Fuel & Iron Corp.	1,800,000	1,485,000	1,485,000	1,485,000	1,485,000
Columbia-Geneva Steel Div.					
Geneva	2,077,000	1,937,000	1,879,000	1,879,000	1,675,000
Pittsburgh	380,000	380,000	391,000	391,000	391,000
Torrance	222,000	222,000	220,000	224,000	214,000
Total	2,679,000	2,539,000	2,490,009	2,494,000	2,288,000
General Services Adm.	.....	.....	.....	.....	72,300
Hoster Steel Corp.	12,000	12,000	12,000	16,920	16,920
Isaacson Iron Works	102,000	102,000	102,000	102,000	102,000
Judson Steel Co.	76,500	76,500	76,500	76,500	76,500
Kaiser Steel Corp.	1,536,000	1,536,000	1,536,000	1,536,000	1,536,000
R. G. Le Tourneau, Inc.	83,100	83,100	83,100	83,100	138,600
Lone Star Steel Co.	550,000	550,000	550,000	550,000	.....
National Supply Co.	50,200	50,200	50,200	50,200	50,200
Northwest Steel Rolling Mills	48,600	46,000	42,000	42,000	42,000
Oregon Steel Mills	120,000	120,000	120,000	110,000	110,000
Pacific States Steel Corp.	216,000	181,770	181,770	181,770	298,000
Seidelhuber Steel Rolling Mill Co.	.....	.....	.....	.....	60,000
Sheffield Steel Corp. (Armco)					
Sands Springs	120,000	60,000	54,000	54,000	54,000
Houston	1,200,000	1,050,000	1,050,000	1,050,000	1,050,000
Total	1,320,000	1,110,000	1,104,000	1,104,000	1,104,000
Southwest Steel Rolling Mills	45,000	45,000	45,000	45,000	45,000
Texas Steel Corp.	70,450	70,450	36,000	36,000	22,320
TOTAL Western District	9,782,150	9,027,820	8,884,370	8,883,290	8,403,640
BUFFALO					
Allegheny Ludlum Steel Co.					
Dunkirk	33,000	33,000	33,000	33,000	33,000
Tonawanda	4,500	4,500	4,500	4,500	4,500
Total	37,500	37,500	37,500	37,500	37,500
Bethlehem Steel Co.	5,720,000	5,520,000	5,100,000	5,000,000	4,740,000
Erie Forge & Steel Co.	234,000	234,000	234,000	234,000	234,000
National Forge & Ordnance Co.	25,000	25,000	25,000	25,000	25,000
Republic Steel Corp.	882,000	882,000	882,000	882,000	882,000
Simonds Saw & Steel Co.	21,600	21,600	21,600	21,600	21,600
Colorado Fuel & Iron Corp.	295,000	295,000	252,000	252,000	252,000
TOTAL Buffalo District	7,215,100	7,015,100	6,552,100	6,452,100	6,192,100
DETROIT					
Allegheny Ludlum Steel Corp.	3,000	3,000	3,000	3,000	3,000
Ford Motor Co.	1,877,400	1,877,420	1,755,000	1,755,000	1,648,200
Great Lakes Steel Co. (National Steel Corp.)	3,200,000	3,200,000	3,400,000	3,400,000	3,150,000
McLouth Steel Corp.	1,380,000	1,380,000	1,200,000	967,780	579,700
Rotary Electric Steel Corp.	300,000	300,000	425,000	425,000	425,000
TOTAL Detroit District	6,760,400	6,760,420	6,783,000	6,550,780	5,805,900
CLEVELAND					
Jones & Laughlin Steel Corp.	1,400,000	1,305,000	1,305,000	1,305,000	1,305,000
National Tube Div.	2,565,000	2,364,000	2,364,000	2,364,000	2,320,000
Republic Steel Corp.	2,860,000	2,572,000	2,572,000	2,572,000	2,572,000
TOTAL Cleveland District	6,825,000	6,241,000	6,241,000	6,241,000	6,197,000

DISTRICT—COMPANY	Rated Annual Capacity—Net Tons				
	1957	1956	1955	1954	1953
SOUTHERN					
Atlantic Steel Co.	400,000	450,000	300,000	300,000	300,000
Connors Steel Div., (H. K. Porter Co., Inc.)	115,000	115,000	67,500	67,500	67,500
Kilby Steel Co.	34,020	34,020	34,020	34,020	34,020
Knoxville Iron Co.	38,000	38,000	38,000	38,000	38,000
Mississippi Steel Corp.	45,000	.....	.....	.....	.....
Newport News S. & D. Co.	12,000	12,000	12,000	12,000	12,000
Republic Steel Corp.	789,000	789,000	789,000	789,000	789,000
Roanoke Electric Steel Corp.	24,000	.....	.....	.....	.....
Southern Electric Steel Co.	66,000	.....	.....	.....	.....
Tennessee Coal & Iron Div.					
Ensley	1,770,000	1,770,000	1,770,000	1,745,000	1,625,000
Fairfield	2,227,000	2,227,000	2,227,000	2,086,000	1,830,000
Total	3,997,000	3,997,000	3,997,000	3,831,000	3,455,000
TOTAL Southern District	5,520,020	5,435,020	5,237,520	5,071,520	4,695,520
UPPER OHIO RIVER †					
Ohio River Steel Div. (Louis Backman Co.)	136,080	136,080	136,080	136,080	136,080
Weirton Steel Co. (National Steel Corp.)	3,000,000	2,800,000	2,600,000	2,600,000	2,500,000
Wheeling Steel Corp.					
Benwood	.....	.....	.....	.....	420,000
Steubenville	2,200,000	2,130,000	2,130,000	2,130,000	1,440,000
Total	.....	.....	.....	.....	1,860,000
TOTAL Wheeling District	5,336,080	5,066,080	4,866,080	4,866,080	4,496,080
SOUTH OHIO RIVER					
American Compressed Steel Co.	21,600	21,600	21,600	.....	.....
Armco Steel Corp.					
Ashland	952,000	950,000	900,000	870,000	860,000
Middletown	2,249,000	1,815,000	1,715,000	1,697,000	1,548,000
Total	3,201,000	2,765,000	37,500	2,567,000	2,408,000
Connors Steel Div.	84,000	78,840	72,000	68,000	78,840
Detroit Steel Co.	1,500,000	1,290,000	1,290,000	1,290,000	680,000
Green River Steel Co.	183,190	179,400	198,000	241,920	198,000
Newport Steel Corp. (Merritt-Chapman & Scott)	608,000	708,500	708,500	708,500	708,500
TOTAL South Ohio District	5,597,790	5,043,340	4,905,100	4,875,420	4,053,340
ST. LOUIS					
Granite City Steel Co.	1,200,000	1,080,000	1,290,000	1,290,000	720,000
Keystone Steel & Wire Co.	450,000	425,000	425,000	425,000	400,000
Laclede Steel Co.	500,000	500,000	500,000	500,000	410,000
Sheffield Steel Div. (Armco)	780,000	630,000	630,000	630,000	630,000
TOTAL St. Louis District	2,930,000	2,635,000	2,845,000	2,785,000	2,160,000
NORTHEAST					
Allegheny Ludlum Steel Co.	77,000	77,000	77,000	77,000	77,000
American Steel & Wire Div.	287,000	287,000	287,000	287,000	275,000
Crucible Steel Co. of America					
Harrison	7,800	7,800	7,800	7,800	7,100
Syracuse	59,600	59,600	59,600	59,600	59,600
Total	67,400	67,400	67,400	67,400	66,700
Northeastern Steel Corp.	303,200	303,200	188,280	188,280	188,280
Washburn Wire Co.	93,000	93,000	93,000	93,000	93,000
Wickwire Brothers, Inc.	30,300	21,380	20,800	19,830	.....
TOTAL Northeast District	857,900	848,980	733,480	732,510	699,980

† Formerly "Wheeling"

Official Steel Industry Capacities

Source: American Iron and Steel Institute

THE IRON AGE DISTRICTS STEEL CAPACITY

In Thousands of Net Tons—Source: American Iron and Steel Institute—Compilations: The Iron Age

District	1957		1956		1955		1954		1953	
	Net Tons	Pct of Total	Net Tons	Pct of Total	Net Tons	Pct of Total	Net Tons	Pct of Total	Net Tons	Pct of Total
Chicago	26,341	19.74	25,249	19.67	25,008	19.87	24,587	19.78	22,801	19.40
Pittsburgh	23,744	17.79	23,374	18.21	22,987	18.27	23,016	18.15	23,533	20.02
Philadelphia	17,544	13.15	17,308	13.48	16,859	13.40	16,386	13.18	14,834	12.62
Valley	15,006	11.24	14,372	11.20	13,939	11.08	13,896	11.18	13,664	11.62
Western	9,782	7.33	9,028	7.03	8,884	7.06	8,883	7.14	8,404	7.15
Buffalo	7,215	5.41	7,015	5.46	6,552	5.21	6,452	5.19	6,192	5.27
Detroit	6,760	5.07	6,760	5.27	6,783	5.39	6,551	5.27	5,806	4.94
Cleveland	6,825	5.11	6,241	4.86	6,241	4.96	6,241	5.02	6,197	5.27
Southern	5,520	4.14	5,423	4.22	5,226	4.15	5,060	4.07	4,683	3.98
Upper Ohio River	5,336	4.00	5,066	3.95	4,866	3.87	4,866	3.91	4,496	3.82
South Ohio River	5,598	4.19	5,043	3.93	4,905	3.90	4,875	3.92	4,053	3.45
St. Louis	2,930	2.19	2,635	2.05	2,845	2.26	2,785	2.24	2,160	1.84
Northeast	857	0.64	849	0.66	733	0.58	733	0.59	724	0.62
Total	133,459	100.00	128,363	100.00	125,828	100.00	124,330	100.00	117,547	100.00

BLAST FURNACE CAPACITIES BY COMPANIES AND GEOGRAPHIC LOCATION

Annual Capacity of Blast Furnaces as of January 1, 1957

	No. of stacks	Total annual capacity (N. T.)
Companies:		
Alan Wood Steel Company	2	454,800
Armco Steel Corporation	6	2,104,000
Sheffield Division	1	420,000
TOTAL	7	2,524,000
Barium Steel Corporation:		
Phoenix Iron and Steel Co.	1	200,000
Berkman Company, Louis	1	136,800
Bethlehem Steel Company	33	(a) 12,830,000
Colorado Fuel and Iron Corporation	7	1,425,040
Crucible Steel Company of America	3	895,000
Detroit Steel Corporation	2	768,700
Eastern Gas and Fuel Associates	1	195,000
Ford Motor Company	3	1,165,980
Granite City Steel Company	2	675,000
Inland Steel Company	8	3,011,200
Interlake Iron Corporation	7	1,630,000
International Harvester Company	3	808,000
Jackson Iron & Steel Company	1	95,000
Jones & Laughlin Steel Corporation	13	4,607,000
Kaiser Steel Corporation	3	1,314,000
Lavino & Company, E. J.	3	(b) 184,000
Lone Star Steel Company	1	385,000
McLouth Steel Corporation	1	483,500
Merritt-Chapman & Scott Corp.:		
Tennessee Products & Chemical Corp.	3	317,740
National Steel Corporation:		
Great Lakes Steel Corporation	4	2,120,000
Hanna Furnace Corporation	4	850,000
Weirton Steel Company	4	2,100,000
TOTAL	12	5,070,000
New Jersey Zinc Company	2	(c) 112,000
Pittsburgh Coke & Chemical Company	3	836,500
Pittsburgh Steel Company	3	980,000
Republic Steel Corporation	23	7,733,000
Sharon Steel Corporation	3	814,400
Shenango Furnace Company	2	445,450
Tonawanda Iron Division, American Radiator & Stand. Sanitary Corp.	1	165,000
United States Pipe & Foundry Co.	4	491,710
United States Steel Corporation:		
United States Steel Corp. (Central Operations)	53	(d) 19,410,300
American Steel & Wire Division	6	1,693,000
Columbia-Geneva Steel Division	5	1,804,200

(a) Includes 216,000 tons ferroalloys capacity.
(b) Ferromanganese only.
(c) Spiegeleisen only.
(d) Includes 237,600 tons ferroalloys capacity.

Capacity of Blast Furnaces — January 1, 1957 (*Continued*)

	No. of stacks	Total annual capacity (N. T.)
Companies (Continued):		
National Tube Division	9	3,275,000
Tennessee Coal & Iron Division	9	(e) 3,209,000
TOTAL	82	(f) 29,391,500
Wheeling Steel Corporation	6	1,860,000
Woodward Iron Company	4	772,630
Youngstown Sheet & Tube Company	13	4,140,000
GRAND TOTAL	162	(g) 86,817,950
Plant Location and Operating Company:		
Alabama (Southern District)		
Birmingham		
Republic Steel Corporation	2	402,000
United States Pipe & Foundry Co.	2	281,230
Ensley		
Tennessee Coal & Iron Division	6	(e) 1,898,300
Fairfield		
Tennessee Coal & Iron Division	3	1,310,700
Gadsden		
Republic Steel Corporation	2	525,000
North Birmingham		
United States Pipe & Foundry Co.	2	210,480
Woodward		
Woodward Iron Company	4	772,630
TOTAL	21	(e) 5,400,340
California (Western District)		
Fontana		
Kaiser Steel Corporation	3	1,314,000
Colorado (Western District)		
Pueblo		
Colorado Fuel and Iron Corporation	4	883,840
Illinois (Chicago District)		
Chicago		
Interlake Iron Corporation	2	587,000
International Harvester Company	3	808,000
Republic Steel Corporation	1	517,000
United States Steel Corp. (Central Operations)	11	4,196,700
Youngstown Sheet and Tube Company	3	684,000
Granite City		
Granite City Steel Co.	2	675,000
TOTAL	22	7,467,700

(e) Includes 39,000 tons ferroalloys capacity.
(f) Includes 276,600 tons ferroalloys capacity.
(g) Includes 788,600 tons ferroalloys capacity.

Capacity of Blast Furnaces — January 1

Indiana (Chicago District)	
East Chicago	
Inland Steel Company	
Youngstown Sheet and Tube Company	
Gary	
United States Steel Corp. (Central Operations)	
TOTAL	
Kentucky (Pittsburgh - Youngstown District)	
Ashland	
Armco Steel Corporation	
Maryland (Eastern District)	
Sparrows Point	
Bethlehem Steel Company	
Massachusetts (Eastern District)	
Everett	
Eastern Gas and Fuel Associates	
Michigan (Cleveland - Detroit District)	
Dearborn	
Ford Motor Company	
River Rouge	
Great Lakes Steel Corporation	
Trenton	
McLouth Steel Corporation	
TOTAL	
Minnesota (Chicago District)	
Duluth	
American Steel & Wire Division	
Interlake Iron Corporation	
TOTAL	
New York (Eastern District)	
Buffalo	
Hanna Furnace Corporation	
Republic Steel Corporation	
Lackawanna	
Bethlehem Steel Company	
North Tonawanda	
Tonawanda Iron Division	
Tonawanda	
Colorado Fuel & Iron Corporation	
Troy	
Republic Steel Corporation	
TOTAL	

STEEL CAPACITY BY COMPANIES AND TYPES

Annual Steel Capacity (Ingots and Steel for Castings) as of January 1, 1957
(Capacities of Foundries Which Normally Produce Steel Only for Castings are not Included)

	OPEN HEARTH		BESSEMER		ELECTRIC AND CRUCIBLE		Total annual capacity (N. T.)
	No.	Annual capacity (N. T.)	No.	Annual capacity (N. T.)	No.	Annual capacity (N. T.)	
Kinds:							
Open hearth—basic	886	116,092,520					116,092,520
Open hearth—acid	35	819,890					819,890
Oxygen Converter					3	540,000	540,000
Bessemer			(d) 33	4,505,000			4,505,000
Electric					367	11,501,700	11,501,700
Crucible					1	40	40
TOTAL	921	116,912,410	(d) 33	4,505,000	371	12,041,740	133,459,150
Companies:							
Acme-Newport Steel Co.	7	325,000	....	.....	3	283,000	608,000
Alan Wood Steel Co.	9	800,000	....	.....	....	.....	800,000
Alco Products, Inc.	3	103,000	....	.....	1	2,160	105,160
Allegheny Ludlum Steel Corporation	5	312,000	....	.....	30	552,200	864,200
American Compressed Steel Corp.	....	.....	....	.....	1	21,600	21,600
Armco Steel Corporation	37	3,381,000	....	.....	9	469,000	3,850,000
Sheffield Division	13	1,380,000	....	.....	5	720,000	2,100,000
TOTAL	40	4,761,000	....	.....	14	1,189,000	5,950,000
Atlantic Steel Company	3	124,000	....	.....	2	276,000	400,000
Babcock & Wilcox Company	....	.....	....	.....	4	229,450	229,450
Baldwin-Lima-Hamilton Corp.	8	169,920	....	.....	(a) 1	40	169,960
Barium Steel Corporation:							
Industrial Forge & Steel Co.	2	48,600	....	.....	....	.....	48,600
Phoenix Iron & Steel Co.	11	806,760	....	.....	1	40,000	846,760
TOTAL	13	855,360	....	.....	1	40,000	895,360
Berkman Company, Louis Ohio River Steel Div.	4	136,080	....	.....	....	.....	136,080
Bethlehem Steel Corp.:							
Bethlehem Steel Co.	125	18,934,000	3	336,000	6	230,000	19,500,000
Bethlehem Pacific Coast Steel Corp.	10	522,000	....	.....	3	478,000	1,000,000
TOTAL	135	19,456,000	3	336,000	9	708,000	20,500,000
Borg-Warner Corporation:							
Ingersoll Steel Div.	....	.....	....	.....	4	64,000	64,000
Ingersoll Products Div.	....	.....	....	.....	2	100,000	100,000
TOTAL	....	.....	....	.....	6	164,000	164,000
Braeburn Alloy Steel Corp.	....	.....	....	.....	2	20,730	20,730
Byers Company, A. M.	....	.....	....	.....	3	90,000	90,000
Cabot Shops, Inc.	....	.....	....	.....	1	14,500	14,500
Cameron Iron Works, Inc.	....	.....	....	.....	2	58,800	58,800
Carpenter Steel Company	....	.....	....	.....	6	86,000	86,000
Colorado Fuel & Iron Corp.	27	2,594,500	....	.....	....	.....	2,594,500
Roebling's Sons Corp., J. A.	9	235,000	....	.....	....	.....	235,000
TOTAL	36	2,829,500	....	.....	....	.....	2,829,500

Steel Capacity (Ingots and Steel for Castings) January 1, 1957 (*Continued*)

	OPEN HEARTH		BESSEMER		ELECTRIC AND CRUCIBLE		Total annual capacity (N. T.)
	No.	Annual capacity (N. T.)	No.	Annual capacity (N. T.)	No.	Annual capacity (N. T.)	
Companies (Continued):							
Columbia Tool Steel Co.	....	.....	....	.....	2	6,600	6,600
Continental Steel Corp.	5	420,000	....	.....	....	.....	420,000
Copperweld Steel Co.	....	.....	....	.....	7	660,000	660,000
Crucible Steel Company of America	9	1,044,000	....	.....	17	379,400	1,423,400
Detroit Steel Corp.	15	1,500,000	....	.....	....	.....	1,500,000
Eastern Stainless Steel Corp.	....	.....	....	.....	4	50,000	50,000
Edgewater Steel Co.	3	117,600	....	.....	....	.....	117,600
Empire Steel Corporation	7	500,000	....	.....	....	.....	500,000
Erie Forge & Steel Corp.	5	234,000	....	.....	....	.....	234,000
Finkl & Sons Co., A.	....	.....	....	.....	3	33,600	33,600
Firth Sterling Inc.	....	.....	....	.....	3	20,040	20,040
Ford Motor Company	10	1,677,150	....	.....	5	200,250	1,877,400
Granite City Steel Co.	7	1,200,000	....	.....	....	.....	1,200,000
Green River Steel Corp.	....	.....	....	.....	2	183,190	183,190
Harrisburg Steel Co., Div. of Harsco Corp.	3	100,750	....	.....	....	.....	100,750
Heppenstall Company	2	50,470	....	.....	1	5,080	55,550
Hooter Steel Corporation	....	.....	....	.....	1	12,000	12,000
Inland Steel Company	40	5,500,000	....	.....	....	.....	5,500,000
International Harvester Company	11	1,200,000	....	.....	....	.....	1,200,000
Isaacson Iron Works	....	.....	....	.....	2	102,000	102,000
Jessop Steel Company	....	.....	....	.....	4	35,740	35,740
Jones & Laughlin Steel Corporation	37	5,998,000	3	600,000	1	2,000	6,600,000
Joslyn Mfg. & Supply Co.	....	.....	....	.....	3	37,500	37,500
Judson Steel Corporation	5	76,500	....	.....	....	.....	76,500
Kaiser Steel Corp.	9	1,536,000	....	.....	....	.....	1,536,000
Keystone Steel & Wire Co.	4	450,000	....	.....	....	.....	450,000
Kilby Steel Company	....	.....	....	.....	1	34,020	34,020
Knoxville Iron Company	....	.....	....	.....	3	38,000	38,000
Laclede Steel Company	4	500,000	....	.....	....	.....	500,000
Latrobe Steel Company	....	.....	....	.....	5	24,000	24,000
Le Tourneau, Inc., R. G.	....	.....	....	.....	3	83,100	83,100
Lone Star Steel Co.	4	550,000	....	.....	....	.....	550,000
Lukens Steel Company	12	750,000	....	.....	....	.....	750,000
McLouth Steel Corporation	....	.....	....	.....	(f) 2	(f) 1,380,000	1,380,000
Merritt-Chapman & Scott Corp.:							
Milton Steel Prod. Div.	....	.....	....	.....	3	90,000	90,000
Mesta Machine Company	8	121,000	....	.....	1	20,000	141,000
Midvale-Heppenstall Co.	3	100,800	....	.....	3	62,550	163,350
Mississippi Steel Corp.	....	.....	....	.....	1	45,000	45,000
National Forge & Ordnance Company	....	.....	....	.....	3	25,000	25,000
National Steel Corp.:							
Great Lakes Steel Corp.	17	3,200,000	(b) 2	.....	....	.....	3,200,000
Weirton Steel Co.	14	3,000,000	(b) 2	.....	....	.....	3,000,000
TOTAL	31	6,200,000	(b) 4	.....	....	.....	6,200,000

ry 1, 1957 (*Continued*)

	No. of stacks	Total annual capacity (N. T.)
....	8	3,011,200
any	3	1,296,000
....	12	4,782,300
....	23	9,089,800
....	9	902,000
....	9	4,272,000
....	1	195,000
....	3	1,165,980
....	4	2,120,000
....	1	483,500
....	8	3,769,480
....	2	491,000
....	1	146,000
....	3	637,000
....	4	850,000
....	2	618,000
....	7	3,096,000
....	1	165,000
....	2	390,000
....	1	263,000
....	17	5,382,000

Capacity of Blast Furnaces — January 1, 1957 (*Continued*)

	No. of stacks	Total annual capacity (N. T.)
Ohio (Pittsburgh - Youngstown District)		
Campbell		
Youngstown Sheet and Tube Company	4	1,452,000
Canton		
Republic Steel Corporation	1	266,000
Hubbard		
Youngstown Sheet and Tube Company	1	204,000
Jackson		
Interlake Iron Corporation	1	75,000
Jackson Iron & Steel Company	1	95,000
Lowellville		
Sharon Steel Corporation	1	148,600
Martins Ferry		
Louis Berkman Company	1	136,800
Massillon		
Republic Steel Corporation	1	266,000
Middletown		
Armco Steel Corporation	1	572,000
New Miami		
Armco Steel Corporation	2	630,000
Portsmouth		
Detroit Steel Corporation	2	768,700
Steubenville		
Wheeling Steel Corporation	5	1,614,000
Struthers		
Pittsburgh Coke & Chemical Company	1	182,500
Warren		
Republic Steel Corporation	1	569,000
Youngstown		
Republic Steel Corporation	5	1,773,000
United States Steel Corp. (Central Operations)	8	2,101,400
Youngstown Sheet and Tube Company	2	504,000
SubTotal (Pitts. - Youngs. Dist.)	36	11,358,000
Ohio (Cleveland - Detroit District)		
Cleveland		
American Steel & Wire Division	2	752,000
Jones & Laughlin Steel Corporation	2	760,000
Republic Steel Corporation	6	2,534,000
Lorain		
National Tube Division	5	1,995,000
Toledo		
Interlake Iron Corporation	2	551,000
SubTotal (Clev. - Det. Dist.)	17	6,592,000
TOTAL—Ohio	53	17,950,000
Pennsylvania (Pittsburgh - Youngstown District)		
Aliquippa		
Jones & Laughlin Steel Corporation	5	1,920,000
Braddock		
United States Steel Corp. (Central Operations)	7	2,730,200

Capacity of Blast Furnaces — January 1, 1957 (*Continued*)

	No. of stacks		Total annual capacity (N. T.)
Pennsylvania (Pittsburgh - Youngstown District) (Continued):			
Clairton			
United States Steel Corp. (Central Operations)	3		772,600
Donora			
American Steel & Wire Division	2		450,000
Duquesne			
United States Steel Corp. (Central Operations)	6	(a)	1,338,000
Farrell			
Sharon Steel Corporation	2		665,800
McKeesport			
National Tube Division	4		1,280,000
Midland			
Crucible Steel Company of America	3		895,000
Monessen			
Pittsburgh Steel Company	3		980,000
Neville Island			
Pittsburgh Coke & Chemical Company	3		654,000
Pittsburgh			
Jones & Laughlin Steel Corporation	6		1,927,000
Rankin			
United States Steel Corp. (Central Operations)	6		2,236,800
Sharpsville			
Shenango Furnace Company	2		445,450
SubTotal (Pitts. - Youngs. Dist.)	51		16,294,850
Pennsylvania (Eastern District)			
Bethlehem			
Bethlehem Steel Company	7		2,708,000
Birdsboro			
Colorado Fuel and Iron Corporation	1		151,200
Chester			
Barium Steel Corp.:			
Phoenix Iron and Steel Co.	1		200,000
Erie			
Interlake Iron Corporation	1		271,000
Fairless Hills			
United States Steel Corp. (Central Operations)	2		1,252,000
Johnstown			
Bethlehem Steel Company	7	(b)	1,746,000
Palmerton			
New Jersey Zinc Company	3	(c)	112,000
Sheridan			
Lavino and Company, E. J.	1	(d)	56,000
Steelton			
Bethlehem Steel Company	3		1,008,000
Swedeland			
Alan Wood Steel Company	3		454,800
SubTotal (Eastern Dist.)	27		7,959,000
TOTAL—Pennsylvania	78	(e)	24,253,850

(a) Includes 237,600 tons ferroalloys capacity.
(b) Includes 216,000 tons ferroalloys capacity.
(c) Spiegeleisen only.
(d) Ferromanganese only.
(e) Includes 621,600 tons ferroalloys capacity.

Steel Capacity (Ingots and Steel for Castings) January 1, 1957 (*Continued*)

	OPEN HEARTH		BESSEMER		ELECTRIC AND CRUCIBLE		Total annual capacity (N. T.)
	No.	Annual capacity (N. T.)	No.	Annual capacity (N. T.)	No.	Annual capacity (N. T.)	
Companies (*Continued*):							
National Supply Co.	...	...	...	...	3	50,300	50,300
Newport News Shipbuilding & Dry Dock Co.					5	12,000	12,000
Northeastern Steel Corp.	3	188,380			2	114,920	303,200
Northwest Steel Rolling Mills, Inc.					2	48,600	48,600
Northwestern Steel & Wire Co.					5	825,000	825,000
Oregon Steel Mills					3	120,000	120,000
Pacific States Steel Corp.	3	216,000					216,000
Pittsburgh Steel Co.	12	1,320,000					1,320,000
Porter Co., Inc., H. K.:							
Connors Steel Div.					4	199,000	199,000
Vulcan Crucible Steel Co.					2	9,600	9,600
TOTAL					6	208,600	208,600
Republic Steel Corp.	78	8,840,000	2	665,000	36	1,542,000	11,047,000
Roanoke Electric Steel Corp.					1	24,000	24,000
Rotary Electric Steel Co.					6	300,000	300,000
Sharon Steel Corp.	17	1,826,000			2	72,000	1,898,000
Simonds Saw & Steel Co.					3	21,600	21,600
Southern Electric Steel Co.					3	66,000	66,000
Southwest Steel Rolling Mills					1	45,000	45,000
Texas Steel Company					3	70,450	70,450
Timken Roller Bearing Company					9	700,000	700,000
Union Electric Steel Corp.					2	26,760	26,760
United States Steel Corp.:							
United States Steel Corp. (Central Operations)	177	24,949,000	(c) 8	1,284,000	9	387,000	26,620,000
American Steel & Wire Div.	26	2,275,000					2,275,000
Columbia Geneva Steel Div.	19	2,679,000					2,679,000
National Tube Div.	15	3,021,000	6	990,000			4,011,000
Tennessee Coal & Iron Div.	23	3,997,000	(b) 3				3,997,000
TOTAL	260	36,921,000	17	2,274,000	9	387,000	39,582,000
Universal-Cyclops Steel Corporation					5	70,160	70,160
Vanadium-Alloys Steel Co.					4	12,000	12,000
Colonial Steel Co.					2	30,000	30,000
TOTAL					6	42,000	42,000
Washburn Wire Co.	4	93,000					93,000
Wheeling Steel Corp.	11	1,630,000	2	570,000			2,200,000
Wickwire Brothers, Inc.					2	30,300	30,300
Youngstown Sheet and Tube Company	41	6,180,000	2	60,000			6,240,000
GRAND TOTAL	921	116,912,410	(d) 33	4,505,000	(e)271	12,041,740	133,459,150

Capacity of Blast Furnaces — January 1, 1957 (*Continued*)

	No. of stacks	Total annual capacity (N. T.)
Tennessee (Southern District)		
Lyles-Wrigley		
Merritt-Chapman & Scott Corp.:		
Tennessee Products & Chemical Corp.	1	36,300
Rockwood		
Merritt-Chapman & Scott Corp.:		
Tennessee Products & Chemical Corp.	2	181,440
TOTAL	3	217,740
Texas (Southern District)		
Houston		
Sheffield Division	1	420,000
Lone Star		
Lone Star Steel Company	1	385,000
TOTAL	2	805,000
Utah (Western District)		
Geneva		
Columbia-Geneva Steel Division	3	1,321,500
Ironton		
Columbia-Geneva Steel Division	2	482,700
TOTAL	5	1,804,200
Virginia (Southern District)		
Lynchburg		
Lavino and Company, E. J.	2	(a) 128,000
West Virginia (Pittsburgh - Youngstown District)		
Benwood		
Wheeling Steel Corporation	1	246,000
Weirton		
Weirton Steel Company	4	2,100,000
TOTAL	5	2,346,000
DISTRIBUTION BY DISTRICTS:		
Eastern	54	(b) 17,808,000
Pittsburgh-Youngstown	95	(c) 30,900,850
Cleveland-Detroit	25	10,361,480
Chicago	48	17,194,500
Southern	28	(d) 6,551,080
Western	12	4,002,040
TOTAL	262	(e) 86,817,950

(a) Ferromanganese only.
(b) Includes 384,000 tons ferroalloys capacity.
(c) Includes 237,600 tons ferroalloys capacity.
(d) Includes 167,000 tons ferroalloys capacity.
(e) Includes 788,600 tons ferroalloys capacity.

COKE CAPACITY

Annual Coke Capacity as of January 1, 1957
(Coke Capacity of Iron and Steel Industry)

	BEEHIVE		OTHER		Total annual capacity (N. T.)
	No. of ovens	Annual capacity (N. T.)	No. of ovens	Annual capacity (N. T.)	
Companies:					
Alan Wood Steel Company	...	...	151	600,000	600,000
Armco Steel Corporation	...	...	186	1,045,000	1,045,000
Sheffield Division	...	...	62	360,000	360,000
TOTAL	...	...	248	1,405,000	1,405,000
Bethlehem Steel Company	...	...	2,208	11,450,000	11,450,000
Colorado Fuel and Iron Corporation	...	...	266	1,220,000	1,220,000
Crucible Steel Company of America	...	...	213	831,600	831,600
Detroit Steel Corporation	...	...	108	550,000	550,000
Eastern Gas and Fuel Associates	...	...	108	664,000	664,000
Ford Motor Company	...	...	320	1,320,790	1,320,790
Granite City Steel Company	...	...	76	450,000	450,000
Inland Steel Company	...	...	505	2,598,190	2,598,190
Interlake Iron Corporation	...	...	400	1,637,000	1,637,000
International Harvester Company	...	...	155	750,000	750,000
Jones & Laughlin Steel Corporation	...	...	831	3,888,000	3,888,000
Kaiser Steel Corporation	297	100,000	225	1,006,000	1,106,000
Lone Star Steel Company	...	...	78	438,000	438,000
Merritt-Chapman & Scott Corp.:					
Tennessee Products & Chemical Corp.	...	...	44	251,500	251,500
National Steel Corporation:					
Great Lakes Steel Corporation	...	...	294	2,000,000	2,000,000
Hanna Furnace Corporation	...	...	126	*585,000	*585,000
Weirton Steel Company	...	...	294	1,900,000	1,900,000
TOTAL	...	...	714	4,485,000	4,485,000
Pittsburgh Coke & Chemical Company	...	...	140	1,000,000	1,000,000
Pittsburgh Steel Company	320	228,000	93	644,000	872,000
Republic Steel Corporation	296	215,000	1,128	*6,064,000	*6,279,000
Sharon Steel Corporation	...	...	60	225,000	225,000
Carpentertown Coal & Coke Co.	277	160,000	...	...	160,000
TOTAL	277	160,000	60	225,000	385,000
United States Pipe & Foundry Co.	...	...	180	900,000	900,000
United States Steel Corporation:					
United States Steel Corp. (Central Operations)	1,716	1,042,600	3,043	14,650,800	15,693,400
American Steel & Wire Division	...	...	295	1,418,100	1,418,100
Columbia-Geneva Steel Division	...	...	308	1,345,700	1,345,700
National Tube Division	...	...	354	1,602,200	1,602,200
Tennessee Coal & Iron Division	...	...	558	3,032,500	3,032,500
TOTAL	1,716	1,042,600	4,558	22,049,300	23,091,900
Wheeling Steel Corporation	...	...	314	1,720,000	1,720,000
Woodward Iron Company	...	...	256	938,000	938,000
Youngstown Sheet and Tube Company	...	...	730	4,140,000	4,140,000
GRAND TOTAL	2,906	1,745,600	14,059	71,225,380	72,970,980

* Includes 50% of coke capacity of the Donner-Hanna Coke Corporation, Buffalo, New York

The IRON AGE

Want Extra Copies?

A limited number of reprints of this data will be available upon request to Readers' Service Dept., The Iron Age, Chestnut & 56th Sts., Philadelphia 39, Pa.

(e) Includes 621,600 tons ferroalloys capacity.

REPORT TO MANAGEMENT

Why Workers Don't Quit

There's an old rule of thumb that in bad times workers cling to their jobs with all possible tenacity. In good times, when jobs are easy to get, they tend to flit from job to job with any new promise of better wages—or provocation on their old jobs.

But this rule is now being violated with an amazing disrespect for tradition. Although these are boom times by any standards, workers are sticking to their jobs with depression-like tenaciousness.

Don't think that fear of not being able to get a job is behind this new trend. Good workers, especially skilled ones, know that jobs are relatively easy to get. Some areas are actively recruiting new workers for their plants.

A new study of quit rates by the Bureau of Labor Statistics shows that quits averaged between 0.5 and 1.5 per 100 employees from 1933 through 1940. Then, in wartime, they soared up to around five as workers skipped around the country with little worry over financial security.

In the postwar period, after the dislocation following the immediate end of the war, the rule of thumb was followed with a great degree of regularity. But that is not the case today.

The Trend to Labor Immobility

At first glance, this trend to immobility in the midst of job plenty may be puzzling. But here are some of the factors as listed by Mr. Ewan Clague, commissioner of the Bureau of Labor Statistics:

1. Growth of trade unionism with emphasis on seniority. A worker with seniority has a greater stake in his job. He is sure that he is not apt to be hit by future layoffs and he doesn't want to lose his seniority rights.

2. Growth of pensions, health and welfare plans. Workers are not likely to leave a company where they have a vested interest in their jobs.

3. The trend to supplemental unemployment benefits. These will be a factor in eliminating layoffs, or fear of them, as a motivation to job quits. (It's noted that the unemployment compensation system as a whole works in this direction.)

4. Growth of large corporations. The larger the plant, the better opportunity to shift workers within the plant. Small companies do not have this flexibility.

Where the 1956 Steel Strike Hurt

Most industry has put the 34-day steel strike of last summer out of their minds. But you will see plenty of evidence of it when annual reports for 1956 start coming out.

The steel strike is at the bottom of much of the decline in third quarter sales. They dropped from a national level of $76.9 billion in the second quarter to $74.6 billion in the third.

This isn't exactly depression level—last year's third quarter sales were $69.2 billion. But the decline in sales did result in a proportionately greater decline in profits, from $4.2 billion in the second quarter to $3.6 billion in the third.

Figures of the Securities and Exchange Commission show sales for manufacturing declined three pct in the third quarter. Primary iron and steel dropped 29 pct, showing the greatest change.

Also contributing to the decline were the relatively poor sales in the auto industry. Motor vehicle sales were down 19 pct in the same period. This decline was due to other factors, however, not a steel shortage.

INDUSTRIAL BRIEFS

Stamp of Time . . . To mark the 100th anniversary of the steel industry in America, a commemorative stamp will be issued. This stamp will be placed on first-day sales in New York City in 1957 during the 65th general meeting of the American Iron and Steel Institute.

Sound Investment . . . Publication of The Investment Casting Institute's Engineering and Design Manual is scheduled for late spring of 1957. The 64-page manual is designed to aid industry with advantages and limitations of the investment casting process. Rules governing design will be presented to cover questions of dimensional tolerances and shapes. Ferrous and nonferrous alloys recommended for the process will be included.

Let 'Em Roll . . . The first sheets are rolling off the mills of Kaiser Aluminum & Chemical Corp.'s $200 million Ravenswood, W. Va., aluminum production center. Already operating in the partially completed plant are cold-rolling facilities, annealing furnaces, slitters, shears and other auxiliary equipment. The first foil mills are to start rolling in the next few weeks.

Coke Time . . . A contract for 174 combination coke ovens and auxiliary equipment was awarded by Inland Steel Co. to Koppers Co., Inc., Pittsburgh. The ovens will replace 148 now in use at Inland's Indiana Harbor works.

Far East Venture . . . Construction of a horizontal-type partial by-product coke oven in Taiwan (Formosa), involving about $3 million in U. S. financing, has been approved by the International Cooperation Administration. The oven, will be built by the Pioneer Chemical Corp., a Chinese firm.

Follow That Pigeon . . . A contract has been awarded by the Air Materiel Command, Wright-Patterson Air Force Base, Dayton, O., to Ford Instrument Co. The contract is in excess of $15 million for production of a new all-weather navigation system that continuously and automatically tells a pilot where he is, the direction he should fly and the distance to his destination.

Abides By Carbide . . . Allied Carbide Products Inc., Hatboro, Pa., has been named an authorized Carboloy cemented carbide die products agent by General Electric's Metallurgical Products Dept., Detroit. Allied Products will carry a full stock of all standard carbide dies and mandrels used by wire, bar and tube manufacturers.

According to Webster . . . Webster Manufacturing, Inc., Tiffin, O., has purchased the assets of the Eugene C. Stacy Load Binder business. The new corporation will operate as a wholly-owned subsidiary of Webster under the name of the Stacy Load Binder Co. The subsidiary manufactures and markets a load binding device used in the trucking industry. Webster manufactures elevating and conveying equipment and will produce the castings for this new subsidiary.

Pick Your Candidate . . . Nominations are now open for the "Doehler Award." Presented annually by the American Die Casting Institute, the award, consisting of a plaque and cash honorarium of at least $500, recognizes outstanding contributions to the advancement of the die casting art. Nominations, supporting papers, and related materials, should be submitted before April 15, 1957 to: Award Committee, American Die Casting Institute, New York.

Seeing Eye to Eye . . . To expand its production of precision equipment for optical tooling, Keuffel & Esser Co. is opening a factory at Cranford, N. J. It is expected to go into production about February. Optical tooling is a system for precise measurement permitting accuracy as fine as one-thousandth of an inch over distances of more than 100 inches. It operates on the principle that a line of sight is perfectly straight—as a stretched wire can never be because it sags.

Big Day . . . The Cleveland Automatic Machine Co. has merged with the J. H. Day Co., Inc., both of Cincinnati, O. Day operations will be continued as the J. H. Day Co., Division of The Cleveland Automatic Machine Co. The merger of the two companies is part of the expansion and diversification program of the R. K. LeBlond Machine Tool Co., the parent company.

It's Elementary . . . Ceramic fuel elements for atomic reactors are now being made by Norton Co. These elements are molded of uranium oxide and made at the Worcester, Mass., plant. While fuel elements are a new product, Norton has been making reactor control rods of boron carbide for about five years. Further expansion into ceramic fields other than abrasives is part of the company's overall plan for the future.

Stretching Out . . . Kaiser Aluminum & Chemical Corp. has purchased the wire and cable business of the United States Rubber Co. The purchase included U. S. Rubber's insulated wire and cable plant at Bristol, R. I., and its wire and cable inventories. Kaiser takes over its sales organization and network of distributors as well as all Bristol plant personnel.

Unit saves 2¼ man hours on each shaft machined from

OSTUCO TUBING

VERTICAL TRACTION SHAFT

Unit Crane & Shovel Corporation, Milwaukee, "lowered the boom" on costs by using OSTUCO tubing for vertical traction shafts in its line of heavy construction equipment. By eliminating a center-boring operation, Unit *saved 2¼ hours machining time on each shaft.*

OSTUCO tubing has tremendous strength to absorb the constant shock and strain to which Unit equipment is normally subjected and machines easily to precision tolerances.

Cash in on the economy of OSTUCO'S unique "Single-Source-Service"—complete tubing facilities "under one roof"—by contacting your nearest OSTUCO sales office.

OSTUCO SHELBY, OHIO **OSTUCO TUBING**

SEAMLESS AND ELECTRIC-RESISTANCE WELDED STEEL TUBING—Fabricating and Forging

OHIO SEAMLESS TUBE DIVISION
of Copperweld Steel Company • **SHELBY, OHIO**
Birthplace of the Seamless Steel Tube Industry in America

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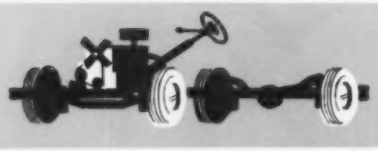

AUTOMOTIVE ASSEMBLY LINE

Behind GM Sales Lag: Price Or Style?

Rumors that General Motors wants fewer sales this year are sheer nonsense . . . Slipping Pontiac, Buick and Olds sales may be more a matter of resistance to prices . . . Styling choice is personal—By *T. L. Carry.*

◆ PROBABLY THE MOST ridiculous recurring rumor in Detroit these days is that General Motors Corp. deliberately styled its 1957 cars so that it would capture a smaller percentage of the retail market and thereby keep the government's antitrust department off its back.

General opinion in the Motor City is that the styling of GM's 1957 line leaves a multitude of things to be desired.

Those who share the belief point out that all of the General Motors cars bear a startling resemblance to last year's models in direct contrast to those being produced by Ford and Chrysler.

A current lag in the sales of Buick, Oldsmobile and Pontiac is being blamed on the lack of new styling.

Styling Opinions Differ . . . It is claimed that GM is too big and too smart a company to be caught napping by its competitors. Therefore, the whole 1957 styling program was designed to capture less of the market. This is nonsense.

It's true that GM cars probably resemble their 1956 counterparts more closely than those of Ford and Chrysler. But who is to say what is good looking and what is not?

Judging the beauty of anything is strictly a personal matter and it holds true in the case of automobiles. What pleases one motorist can displease another. Fortunately, it's differences of opinion that sustain competition.

If Buick, Oldsmobile and Pontiac sales have not lived up to expectations, the major cause could well be the price of the cars rather than their styling.

Curtice Wouldn't Do It . . . Harlow Curtice, GM president, has said many times that there is no standing still in the automobile business. Either a company moves ahead or it falls backwards.

General Motors captured 45.07

First Packard Clipper From South Bend

INITIAL result of the Studebaker-Packard Corp. consolidation of all auto making facilities in South Bend, Ind., is this 1957 Packard Clipper four-door sedan. Model is on display at dealer showrooms for the first time today. It boasts a 275 hp. V-8 engine, equipped with supercharger. More details on page 55.

BULLARD

Announces the acquisition of the

HYDRA-FEED Lathe

(FORMERLY MANUFACTURED BY HYDRA-FEED MACHINE TOOL CORPORATION)

AVAILABLE IN THREE MODELS TO MEET A WIDE RANGE OF REQUIREMENTS

FEATURES

Unobstructed front view design allows faster loading and unloading . . . easier set-up . . . with less operator fatigue.

When used as a tracer lathe templates are above work piece where dirt, chips and cutting oils cannot interfere with work accuracy.

Oversized chip chute with pan below the entire work area . . . readily accessible from end, rear or bottom of machine.

Massive strength and rigidity with extra power to take full advantage of maximum feeds and speeds obtainable with multiple carbide tooling.

THE BULLARD COMPANY

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Please send me a copy of the

BULLARD HYDRA-FEED CATALOG

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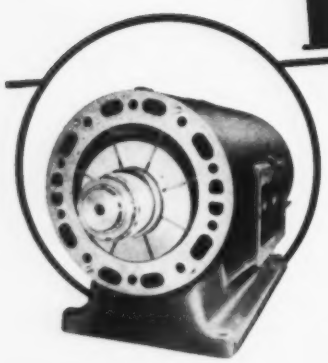
COMPANY _____

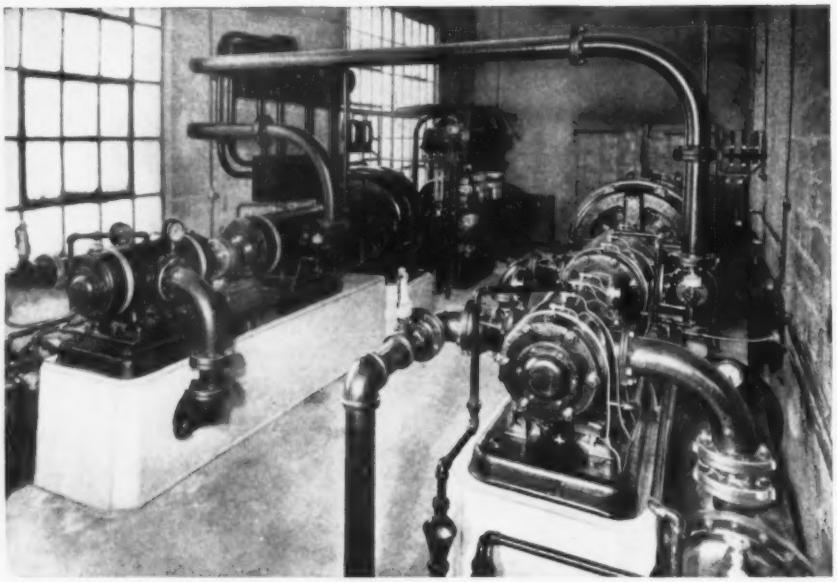
ADDRESS _____

CITY _____ ZONE _____ STATE _____

Fuller pioneered



the two-stage rotary compressor . . . for general industrial use . . . starting in 1930



INSTALLED 1930
STILL GOING STRONG ➡
Two Fuller Rotary Two-stage Compressors. Capacity each 740 c.f.m., 100-lb. pressure.

Fuller Company not only pioneered the rotary compressor for industrial use in this country, but it has always stressed the "spotting" of compressors. There's nothing new or startling about this principle . . . Fuller has advocated it ever since its first machines were put on the market in 1930 . . . applying each compressor to a specific job, with resultant overall plant economy, as well as power savings. Result: the adoption of this economical layout by thousands of users has proved to their satisfaction the soundness of such a program.

Fuller has built and sold thousands of Fuller Rotaries—a large proportion of the two-stage type. And, when plant expansion is necessary, with a consequent demand for more air, additional Fullers are naturally installed.

Fuller engineers have never rested on their oars, but have continually worked to improve design and efficiency, until today, these machines are second to none for dependable air-production in industry.

We welcome the opportunity to present to you all the facts concerning Fuller Rotary Compressors, facts built on actual operational experience. For a complete description of Fuller Rotaries, write for Bulletin C-5A.

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Fuller

PIONEERS OF HIGH-EFFICIENCY VANE TYPE ROTARY COMPRESSORS SINCE 1930

U. S. Automotive Production

WEEK ENDING	CARS	TRUCKS
Jan. 19, 1957	146,376	21,877
Jan. 12, 1957	147,129	20,322
Jan. 21, 1956	144,738	24,551
Jan. 14, 1965	150,030	24,712
TO DATE 1957	384,635	53,286
TO DATE 1956	420,013	68,366

*Estimated. Source: *Ward's Reports*

pct of the new car market in 1953; 50.70 pct in 1954; 50.75 pct in 1955 and 51.10 pct for the first 11 months of 1956.

Can you imagine Mr. Curtice telling Harley Earl, GM vice-president in charge of styling, to style 1957 cars so that the company would capture only 49 pct of the market this year? Don't you believe it.

If GM's market penetration slips this year, and it's too early to make such a prediction, it could be because the company misjudged what the public wanted.

New Packard:

Clipper line has new engine, supercharger, suspension.

The 1957 Packard Clipper was introduced in showrooms across the nation today. Advanced engineering features exclusive in the medium-priced field and 15 pct better performance are its highlights.

In announcing the new cars, Harold E. Churchill, Studebaker-Packard president, said the company will concentrate its Packard program this year in the medium priced field, where up to 80 pct of its Packard sales have been for the past two years.

He said the new line represents a major move toward parts and body interchangeability. The new Packards are the first to be made in South Bend, Ind., following consolidation of Studebaker and Packard.

Some of the features: a completely new 289-cu in. overhead valve V-8 engine with a supercharger as standard equipment; a new suspension system; a Twin-Traction safety differential which automatically compensates for driving conditions on icy, muddy or slippery roads.

The safety differential, which is optional equipment, transfers the major engine driving power to the rear wheel having the best traction.

The sedan is 2 in. lower than last year. Wheelbase is 120½ in.

Passing and acceleration performance is up to 15 pct better than last year. This is due chiefly to the supercharger, Flightomatic transmission and a new 3.31-1 rear axle ratio. The engine is rated at 275 hp.

Included in the Clipper line is a station wagon, first such body type for Packard since 1950.

More Aluminum In Cars

Aluminum Company of America, on the basis of a 6.5 million car forecast, predicts that the auto industry's consumption of aluminum this year will increase 23.5 pct over 1956.

The average 1957 car will use 38.1 lb of aluminum and total usage by the auto industry this year will be over 247 million lb, a new all-time high.

The trucking industry is also turning more and more to the use of aluminum.

Several West Coast companies are using forged aluminum wheels on their vehicles.

Atomic Auto Unlikely

The "atomobile," or atomic powered car, may never be produced.

In any case, any revolutionary means of automotive propulsion that may be introduced in the next few years is not going to be an atomic unit.

These statments come from Dr. Clayton R. Lewis, chief engineer for nuclear research at Chrysler Corp., at the annual meeting of the Society of Automotive Engineers in Detroit.

Dr. Lewis sees no possibility of direct nuclear propulsion for automobiles and trucks. Unless a revolutionary scientific principle is discovered, he says, atomic powerplants will always remain much too heavy for applications in automobiles.

THE BULL OF THE WOODS By J. R. Williams

WHY, THAT DIRTY BUM! PICKIN' UP A GUY IN HIS CAR THAT HE HARDLY KNOWS, AND PASSIN' ME BY-- AN OLD BUDDY!
PROBABLY A SCHEME OF HIS WIFE AND HIS BUDDY TO GET HIM TO WASH UP IN TH' SHOP!
AFTER HE'S HOME FIVE MINUTES I'LL BET HIS WHOLE FAMILY OF SIX HAVE TO TAKE A BATH AN' CLEAN HOUSE!
TAKING THE SHOP HOME
T.M. Reg. U.S. Pat. Off. © 1957 by NEA Service, Inc.
1-23

Cincinnati Combines Quality Control and Production Control

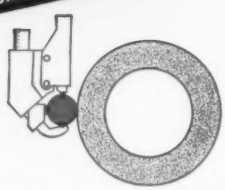
for Your Precision Centertype Grinding

CINCINNATI FILMATIC
6"R x 18"
Plain Hydraulic Grinding Machine
Eq ipped with Quality Control and Production Control

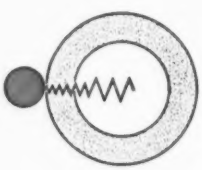
FILMATIC Grinding Wheel Spindle Bearings and Grinding Wheel Balancing are standard equipment. (FILMATIC principle illustrated above.) These two cost-reducing features alone are reason enough to choose CINCINNATI.

Every shop wants closer control of quality and production. It's especially desirable for final operations, when cost per unit nears its maximum. In the field of precision centertype grinding on 6" to 14" machines, Cincinnati's standard and extra features combine quality control and production control into a unified, automatic function of the machine.

The cost-control features illustrated at the right, and many others are outlined in two attractive catalogs: No. G-660-1 for the CINCINNATI® FILMATIC 6"R and 10"L Plain Hydraulic Grinding Machines. No. G-661 for the 10"R and 14"L Machines. Write for copies, or look in Sweet's for brief specifications.



Automatic Air-Electric Gage Sizing (extra) includes an exclusive CINCINNATI advantage . . . cycle time stabilizer for wheel wear and truing.



Gap Eliminator . . . greatly reduces time spent in "cutting air" during automatic infeed grinding operations. (extra)

CINCINNATI GRINDERS INCORPORATED
CINCINNATI 9, OHIO

Members of this family group of CINCINNATI FILMATIC Plain Hydraulic Grinders are:

Size	Between-Center Lengths	Catalog
6"R, 10"L	18" and 30"	G-660-1
10"R, 14"L	18", 36", 48" 72" and 96"	G-661

CINCINNATI FILMATIC

CINCINNATI

CENTERTYPE GRINDING MACHINES • CENTERLESS GRINDING MACHINES • ROLL GRINDING MACHINES • SURFACE • GRINDING MACHINES • CHUCKING GRINDERS
MICRO-CENTRIC GRINDING MACHINES • CENTERLESS LAPPING MACHINES

Rough Treatment Ahead for Ike's Budget

Democrats will jump on appropriations request . . . Charge will be not enough for military . . . Air Force will lead in demanding more funds for next fiscal year . . . Humphrey wants cuts—*By G. H. Baker.*

◆ PRESIDENT EISENHOWER'S new military budget is headed for rough going at the hands of congressional Democrats. Both in the Senate and in the House, cries of "not enough money" are already being heard. Full-dress public hearings are being readied. You'll hear much loose talk about "excessive cutbacks in the Air Force," and "dangerous penny-pinching." Don't fall for it.

The Air Force, although it is due to receive the largest share ($17.4 billion—nearly half) of the new $38 billion military budget, is dissatisfied. It wants much more money, even though President Eisenhower calls for a fattening up of the Air Force spending purse from $16.8 billion to $17.4 billion.

Takes Courage . . . Air Force generals argue that the higher cost of weapons and planes will "eat up" all the increase, leaving no room for expansion. Some key Democrats are gleefully repeating this charge.

It's an easy game to holler for more spending money. What takes political courage is a firm stand against increased government spending.

Says Treasury Secretary George M. Humphrey on this subject: "We are taking too much money out of the economy in the form of taxes. This money should go instead to create new jobs, to expand industry, and to improve our economy."

Tax Situation . . . Chances for tax cuts this year are fading fast. The Eisenhower Administration is telling Congress it needs every cent of revenue it can get. The rising cost of weapons and extra sums for foreign aid are the two chief reasons.

Don't write off completely the possibility of tax cuts, however. There is a growing surge of concern in both the Senate and the House over the plight of smaller firms. Many congressmen are convinced that the existing tax laws are primarily responsible for the large number of business mergers, and also for the failures among small companies.

Relief Chances Slim . . . To correct this weakness in the U. S. economy, some tax relief is due for the "little fellows," it is pointed out. A rash of bills, introduced in both the Senate and the House, spell out ways to extend this relief. Most call for cutting the base rate (on the first $25,000 profits) from 30 pct to 20 pct.

Corporations with profits over $25,000 can't expect any reductions in their taxes this year, however. Nor can any lowering of the manufacturers' excises or consumer excises be reasonably counted upon. And for individuals —poor old John Taxpayer — the chances for lower rates are slim indeed.

Aluminum Imports

Legislation to permit free importation of aluminum and aluminum alloys for a year is before Congress.

A bill, introduced by Rep. Dan Reed, R., N. Y., would suspend the import duty on prime and secondary aluminum in crude form, and bars, billets, and blooms composed of not less than 99 pct aluminum by weight. Also included would be all alloys in crude form and bars, billets and blooms.

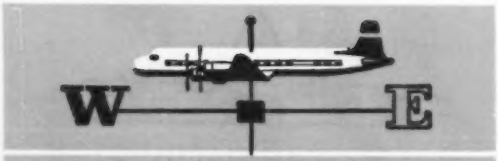
Time To Retire? Maybe Not

■ One way to solve the shortage of scientists and engineers is to forget about compulsory retirement, a White House committee recommends.

■ Dr. H. L. Bevis, former president of Ohio State University and chairman of an Eisenhower committee to stir up interest in scientific careers, points out that the nation is wasting valuable engineering brains by forcing retirement upon skilled and able trained technical men.

■ The Bevis committee is not optimistic about the future. Shortages of good technical men, of engineers, of applied scientists, are to be worse before they get better. Although more engineers are being trained and educated, the demand is running ahead of supply.

■ Example: The 1956 engineering freshman class is the second largest in history—77,738. This is 6.7 pct more than the previous year. Total engineering enrollments are at an all-time high—251,121.



WEST COAST REPORT

Hawaii: A Big "Aloha" For Metalworking

Islanders, spending $425 million yearly on imports, want to expand manufacturing . . . Advantages include good living conditions, plentiful power and skilled labor . . . Area has $1.25 billion economy—*By R. R. Kay.*

◆ HAWAII is flexing its industrial muscles. It has a $1.25 billion economy, but spends an annual $425 million for goods alone on the mainland. West Coast ports handle the bulk of it.

How to keep a healthy part of this $425 million at home is a big problem facing the Islands. More local manufacturing is a logical answer.

Best Candidates . . . But there are two schools of thought. One says, "Leave this Polynesian paradise as it is." The other says, "We've got to have more industry. Let's get on with the job." A recent Honolulu Chamber of Commerce poll shows that 95 pct of its members favor expansion of manufacture. Good bet: more industry is on the way.

Firms most likely to make a go of it in Hawaii will produce goods to displace present imports. Some suggestions that make sense are aluminum and steel products, plastics, jewelry, special chemicals, wood products, and paper.

Island leaders point to these assets: (1) young, skilled labor force; (2) healthy, expanding market; (3) growing middle class; (4) plenty of power; (5) good transportation; and (6) fine living conditions. Population today is 536,000, plus 50,000 in the Armed Services. Some 400,000 people live in Honolulu.

Busy Builders . . . This reporter interviewed Gov. Samuel Wilder King, economists, and businessmen. All agree on the Territory's objective. And an on-the-spot survey shows that the business outlook for 1957 is bright. This will be the biggest year yet.

SHARP EXPANSION in Hawaiian construction, as illustrated by this bridge building, is one reason why the Islanders want metalworking's products. Current construction rate is $150 million a year.

If you're selling your products there, increase your quota. There'll be a sharp expansion in public and private construction this year and next. Rate is over $150 million per year, highest in area's peacetime history.

One third of the Chamber of Commerce members plan to expand during the next 18 months; some 23 pct will buy more equipment; 26 pct will spruce up present facilities in a big way, 23 pct in a small way. And 41 pct will add more workers.

Defense is big business in Hawaii. The Armed Forces spend $300 million per year.

Make It at Home . . . But there's no getting around the fact that Hawaii today has an import economy. It spends 90 pct of its income on the mainland—even imports two-thirds of its food. Economists agree this must change. In order to hold on to its present high prosperity the Territory must produce more goods. Its population and labor force are growing at a rapid pace. Solution: Jack-up output and develop industries.

Let's Talk about Tools and Money

Never in history has competition for the consumer's dollar been keener than it is right now.

In the face of mounting costs, the manufacturer is under continual pressure to turn out a better product at a lower selling price. Inevitably, this problem of producing more for less is laid squarely in the lap of production.

Quite obviously, when machine tool miracles are a "must", to tolerate outmoded equipment is to embrace disaster. Only the *most advanced, most efficient* machine tools can play a part in producing the marvels that *must* be wrought.

We invite you, as a member of production management, to study the following pages on which are shown representative J & L products. JONES & LAMSON MACHINE COMPANY, 511 Clinton Street, Springfield, Vermont.

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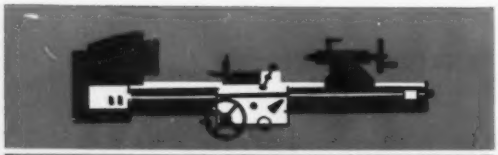

MACHINE TOOL HIGH SPOTS

Safety "Why" of Abrasive Wheels

Grinding Wheel Institute, labor group sponsor new abrasive wheels code . . . Stress safety . . . Not lethal weapons if understanding of all factors precedes their use—By *E. J. Egan, Jr.*

◆ USE GRINDING WHEELS? You should have a copy of the 1956 American Standard Safety Code for "The Use, Care and Protection of Abrasive Wheels." It's a major revision of the 1947 Safety Code, under the sponsorship of the International Assn. of Governmental Labor Officials and the Grinding Wheel Institute.

Why so much fuss about grinding wheel safety? One good reason: by knowing and conforming to the code, you might save a life or prevent crippling injuries.

In 1955, according to the Pennsylvania Dept. of Labor and Industry, grinding wheel accidents caused one death and 346 nonfatal injuries throughout the State. In the same year, other grinding accidents (not attributed directly to abrasive wheels) caused one fatality, 186 injuries.

Not Lethal . . . Statistics for other states are probably available. But the evidence for just one year, one state is strong enough. The point is *not* that grinding wheels and grinding machines are lethal weapons.

Quite the contrary. They're useful tools, and when used in the prescribed manner should be no more dangerous than other metalworking implements.

The logical point made in the new ASA abrasive wheel safety code, in the foreword, is "much misunderstanding exists with respect to the strength of abrasive wheels."

Important Points . . . To clarify the situation, the foreword points out that wheel strength is always limited by the operation it is designed to perform. As the outer abrasive layer becomes worn from grinding, the dull grains must continuously and progressively break free to expose new cutting edges.

Therefore: "Wheels of greater strength than required by the stresses set up on any particular grinding operation will not grind properly for they will not release the dulled grains."

So there is a strength limitation for an abrasive wheel to do the best cutting job. Object of the safety code is to assure everyone that such a limitation need be no handicap to the safe use of grinding wheels and equipment.

Words and Pictures . . . The new code won't tell you whose wheel or what type and grade to use for various jobs and alloys. But it will show you, in words and pictures, everything you can do to see that your wheels, machines and practices conform to the highest possible safety standards.

Every section of the code is written, as such things must be, in somewhat technical-legal language. However, each section has an "antidote" in the form of an explanatory section in the immediate vicinity. Simple language and excellent pictures in these paragraphs makes everything clear.

Now Features . . . The new code contains, for the first time, information on the "revolving cup guard" that has become a popular feature on portable grinding machines. It also shows how to make a guard of hot rolled steel.

Where wheel speeds are concerned, the latest code adds a number of new items. For example, the old speed table is now broken down into "Standard Maximum Speeds" and "Special Maximum Speeds." Moreover, you'll find maximum speeds posted for two new classes of wheels, the "Reinforced" type and the "Depressed Center" type.

If you think you're having too much accidental wheel breakage, there's a discussion of what you should do after each incident. Follow these steps consistently, and you'll do a lot to eliminate the trouble. Users of mounted wheels will find that the old "Critical Speed" tables are now replaced by easier-to-use tables that pointedly say "Maximum Speeds."

Free copies of the new 74-page ASA Code are available from the Grinding Wheel Institute, 2130 Keith Bldg., Cleveland 15, Ohio.

Sets a New High in Automatic, High-Volume Production

A typical example of one Jones & Lamson approach to "automation" is this line. Here is completely automatic handling with both machine transfers and inter-machine transfers. In this line are 4 Fay automatic lathes and 1 milling and center-drilling machine. J & L machines of this type have been in use for many years in production plants throughout the world.

The simple, rugged transfers used in this line were designed, engineered and built by J & L. Control combinations are, of course, tailor-made for each individual application.

Automatic handling is also adapted to grinding operations, as shown by this J & L Model "E" Grinder (inset photo) which handles 136 steering worms per hour.

Send for Catalog No. 56. JONES & LAMSON MACHINE COMPANY, 511 Clinton Street, Springfield, Vermont.

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Thread & Form Grinders

The Iron Age SALUTES

Charles H. Godschall **Manager of tooling and tool engineering for Philco Corp.'s Government and Industrial Div., he is twice winner of the Distinguished Service Award. The U. S. Navy appreciates his underwater ordnance work.**

Picking up Distinguished Service Awards is getting to be a habit with Charles H. Godschall, manager of tooling and tool engineering for Philco Corp.'s Government and Industrial Div. His latest: the Navy DSA for helping perfect the Sidewinder, a new underwater guided missile.

The award was presented to him Jan. 10, by Assistant Secretary of the Navy Raymond H. Fogler. It cited his "outstanding service to the Chief of the Bureau of Ordnance from April, 1954 to May, 1956.

"As a direct result of Mr. Godschall's recommendation concerning major improvements in research and development and underwater ordnance," the citation continues, "the Navy has today thoroughly documented the design disclosure of a new and advanced anti-submarine weapon."

Fourteen years ago, Mr. Godschall won his first DSA—the highest civilian award bestowed by the military. That one was from the Army for his success in conserving critical materials and machinery. As head of Philco's four ordnance plants during World War II, his production planning saved the government a quantity of brass estimated as equal to the size of the Washington Monument.

Born in Lansdale, Pa., on March 24, 1899, he showed more than average interest in machinery while a pupil at Williamson Free School of Mechanical Trades, near Media, Pa. He went on to Drexel Institute of Technology, earning a degree in mechanical engineering.

His first big engineering job took him to Chicago and International Harvester Co. Later, he worked for the Budd Co., and in 1939 joined Philco as manager of the Metal Div., Plant C. His accomplishments in ordnance work have become common knowledge in the industry, especially in the American Ordnance Assn., where he is a deputy chairman.

The ONLY Turret Lathe with a fully automatic thread-chasing cycle!

Here is full turret lathe versatility and a threading attachment with a fully automatic cycle — all in one machine. Now you can be sure of concentricity of threading with other lathe work, *all done in one chucking*, with the time saving of the Auto-Threader! Nowhere else in the world can this be found on a turret lathe.

This Auto-Threader will chase straight or taper threads — or a combination — internal or external, from the front of the machine.

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H. Denis Hughes, elected president and general manager, **Dalic Methachemical Ltd.,** Toronto, Canada.

Jack C. Lucas, elected president, **Ross-Meehan Foundries,** Chattanooga, Tenn.

Keen Johnson, elected vice president, public affairs, **Reynolds Metals Co.,** Richmond, Va.

Robert K. Allen, named superintendent, product development research center, **The Babcock & Wilcox Co.,** Alliance, O.

R. W. Vollmer, named asst. to general manager, Engineering and Construction Div., **Koppers Co., Inc.,** Pittsburgh.

George E. Fouch, appointed marketing consultant, marketing services, **General Electric Co.**

August L. Bartz, named Ft. Worth district sales manager, American Steel & Wire Div.'s Cyclone Fence, **U. S. Steel Corp.,** Waukegan, Ill.

S. N. Smith, named manager, customer service, Frit & Glaze Div., **Ferro Corp.,** Cleveland.

Laurence L. Hartdorn, named manager, instrument transformer sales, Instrument Dept,. **General Electric Co.,** Lynn, Mass.

Charles P. Holderbaum, named manager, Pittsburgh district sales office, **Consolidated Electrodynamics Corp.,** Pasadena, Calif.

Walter D. Roberts, appointed head, Exploration Dept., LaClede-Christy Co. Div., **H. K. Porter Co., Inc.,** St. Louis, Mo.

Richard H. Harris, appointed asst. controller, **Norton Co.,** Worcester, Mass.

L. C. Daniels, named general manager, Buda Div., tractor group, **Allis-Chalmers Mfg. Co; Owen J. Higgins,** named general manager, Buda Div., Harvey, Ill., Works.

Charles J. Meloun, appointed manager, engineering, Outdoor Lighting Dept., **General Electric Co.,** Hendersonville, N. C.

Leon D. Richardson, appointed asst. general sales manager, **Eutectic Welding Alloys Corp.,** Flushing, N. Y.

A. Howard Smith, named manager, commercial research, **The Jeffrey Mfg. Co.,** Columbus, O.

J. H. Fleming, appointed asst. manager, Shipping Container Sales Div., **Wheeling Steel Corp.,** Wheeling, W. Va.

Ford E. Dreves, appointed district manager, Philadelphia, **Wyckoff Steel Co.**

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J. ROY GORDON, elected executive vice president, The International Nickel Co. of Canada, Ltd. and The International Nickel Co., Inc., U. S.

JOHN MOXON, elected executive vice president, The Carpenter Steel Co., Reading, Pa.

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Jones & Lamson Optical Comparators are unexcelled for toolroom, laboratory and production-line inspection and measurement work. They precisely measure height, depth, lead or spacing, as well as angles to degrees and minutes. By comparing intricately contoured parts with a master outline, they measure the amount of error. J & L Comparators are versatile and flexible — perform a variety of inspecting and measuring functions. Moreover, they are convenient to operate, easy to set up, and read direct without computation.

In regard to this typical application, shown below, Modern Corporation, Detroit, says "Modern Corporation's 30-inch J & L Comparator has become the key instrument in the inspection of fine MODCO tools . . . protects quality prestige . . . customers' rejections kept very low . . . saves $3 to $5 per hour when used on large tools."

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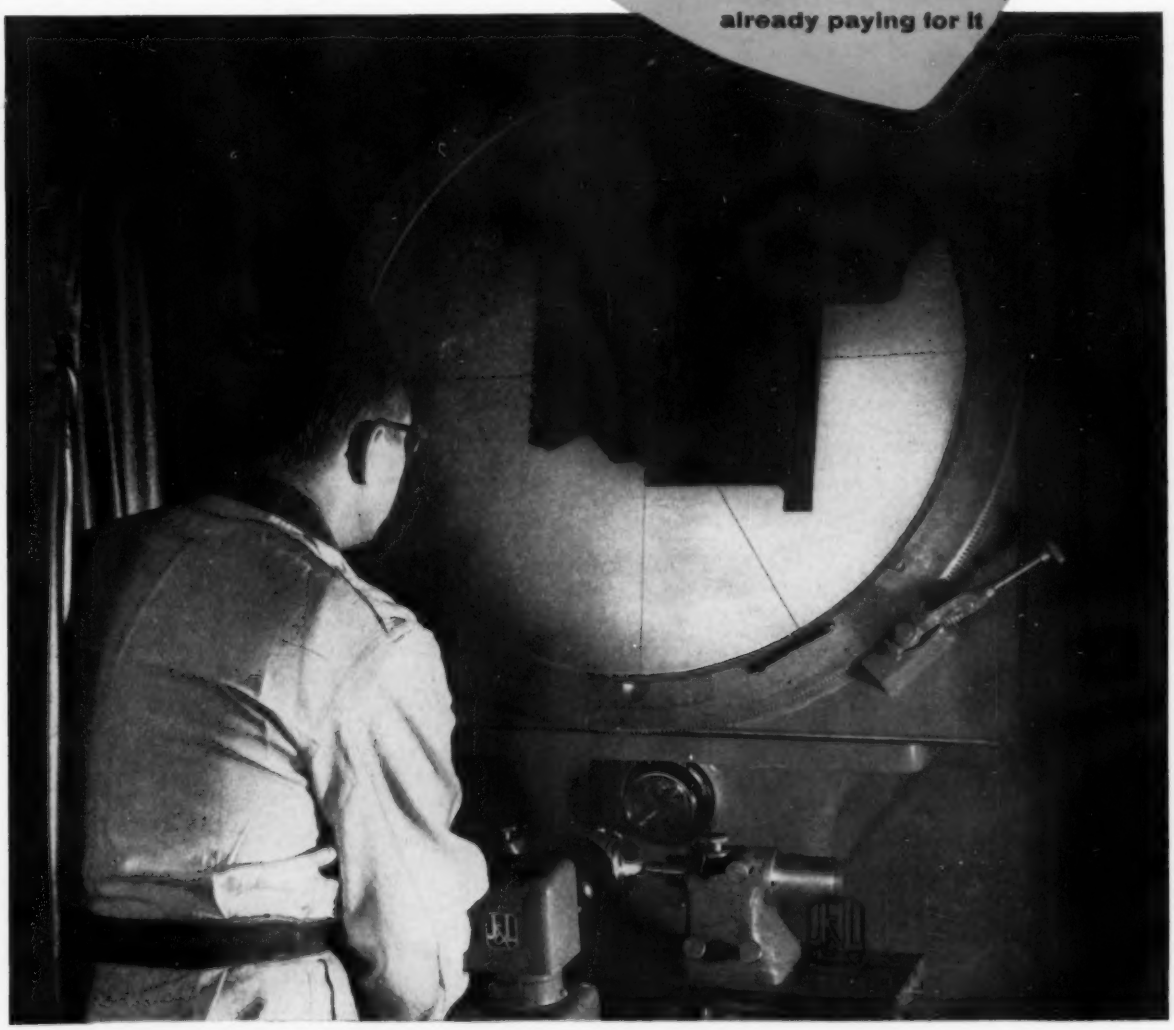

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DAVID H. NICHOLSON, elected vice president, manufacturing, Morgan Engineering Co., Alliance, Ohio.

KENNETH L. VORE, named asst. vice president, traffic, U. S. Steel Corp.

RUDOLPH O. ERICKSON, appointed general traffic manager, The Anaconda Co., New York.

M. M. Cameron, appointed manager, Calgary, Alberta, Canada office, **De Laval Steam Turbine Co.**, Trenton, N. J.

Claude L. Huey, appointed manager, Atlanta district, **The Babcock & Wilcox Co.**, New York.

Randolph M. Duncan, named manager, receiving tube plant, **General Electric Co.**, Owensboro, Ky.

George T. Haffermehl, appointed sales representative, Leschen Wire Rope Div., **H. K. Porter Co., Inc.**

Delbert A. Burman, named buyer, Purchasing Dept., **Crucible Steel Co. of America**, Pittsburgh.

Robert L. Mueller, named direct factory sales representative, **Fischer Special Mfg. Co.**, Cincinnati, O.

John Shorkey, named application engineer, **Vickers Inc.**, Seattle, Wash.

Walter E. Foreman, named abrasive engineer, **Norton Co.**, Columbus, O.

R. M. Arthur, named district purchasing agent, **Bethlehem Pacific Coast Steel Corp.**

Peter L. Kenney and **Henry A. Zarozny**, appointed district representatives, construction materials, **General Electric Co.**, New York district.

Richard T. Fling, appointed supervisor, Aperture Mask Dept., **Superior Tube Co.**, Norristown, Pa.

Dr. Clarence A. Stiegman, named director, product development, **Hooker Electrochemical Co.**, Niagara Falls, N. Y.

Robert Potter, appointed New England sales manager, Alloy Tube Div., **The Carpenter Steel Co.**, Union, N. J.

Robert F. Spillett, named New England tool steel supervisor, **Crucible Steel Co. of America.**

Robert H. Brown, named asst. director, **Alcoa Research Laboratories, Pittsburgh; Charles J. Walton**, named chief, Chemical Metallurgy Div.

Paul L. Smith, named asst. controller, **The Bullard Co.**, Bridgeport, Conn.

William B. Thomas, named plant manager, extrusion plant, **Kaiser Aluminum & Chemical Corp.**, Dolton, Ill.

Robert Newton, named production manager, Central Foundry Div., Danville plant, **General Motors Corp.**

J. J. Stahl, appointed asst. regional manager, eastern district, **A. O. Smith Corp.**, Milwaukee.

H. B. Montross, Jr., named manager, heavy products sales, Columbia-Geneva Div., **U. S. Steel Corp.**, San Francisco.

Nathan J. Cornfeld, appointed patent counsel, Electronic Components Div., **General Electric Co.**, Syracuse, N. Y.

David H. Watkins, appointed chief clerk, **Wheeling Steel Corp.**, Yorkville, O. Works.

John F. Zaman, appointed sales engineer, Machine Div., **Osborn Manufacturing Co.**

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R. F. Rush, named sales manager, Engineering Div., **Ferro Corp.**

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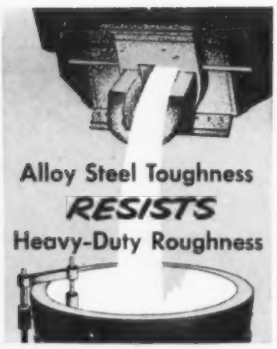

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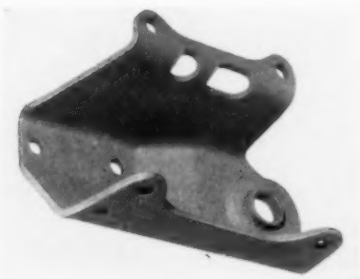

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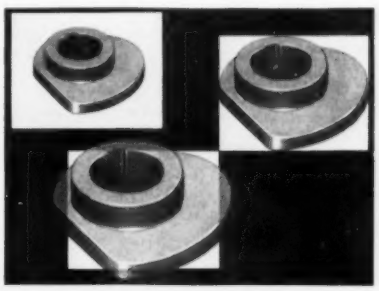

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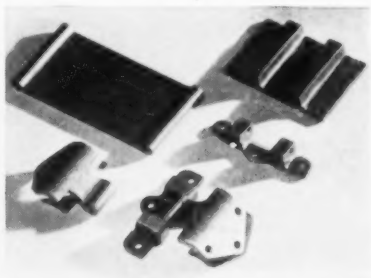

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"Nothing low down about this solvent, eh, Harry?"

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"Who?"

"Dow. Same people who sell Dow Perchloroethylene Industrial for vapor degreasing, Dow Methylene Chloride for stripping and Chlorothene® for cold cleaning. THE DOW CHEMICAL COMPANY, Midland, Michigan."

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FEATURE ARTICLES

Grit Blasting: An Aid To Carburizing Quality

By A. J. SCHWARZKOPF, Metallurgical Supervisor, Curtiss-Wright Corp., Wood-Ridge, N. J.

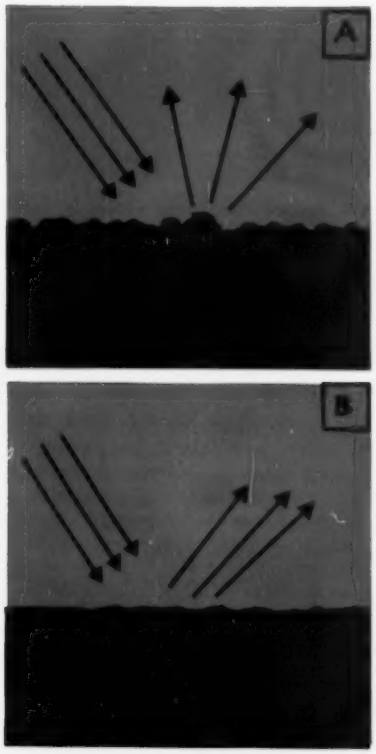


Fig. 1—Rough surface (a) appears dull because reflection disperses incident light. Smoother surface (b) appears brighter because light is not dispersed as much.

◆ Just how do you go about getting a hardness check on a carburized part that has a complex design? . . . At best, it's tough and often impossible . . . But you can check case hardness uniformity visually by first grit blasting the part.

◆ Since grit blasting is often used to clean the part, the test costs no more to "rough" inspect them . . . The grit roughens soft areas but leaves hard areas smooth and almost unaffected . . . Such checking helps to guard against stop-off deficiencies and improves quality.

◆ CERTAIN carburized parts are so complex in design that it's impossible to adequately check them for Rockwell hardness. This is particularly so of aircraft gears and splines. As such, there's a definite need for some other method to check the presence or lack of uniform case hardness on carburized surfaces. That's where grit blasting comes in.

Tests show that a freshly grit blasted surface (No. 120 grit) indicates the relative hardness of different areas on the same part. The surface finish of softer surfaces is appreciably roughened,

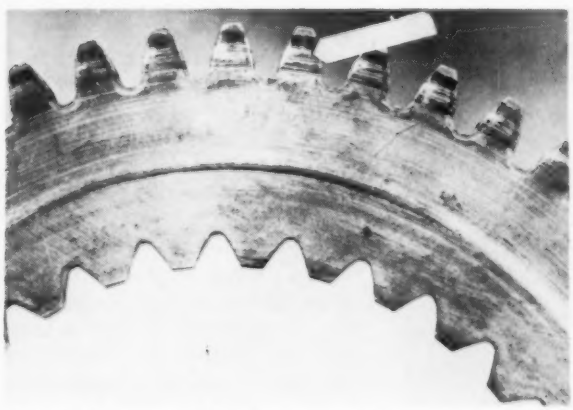


Fig. 2—Improper deburring removed protective copper plate from gear teeth. This permitted case leakage during carburizing.

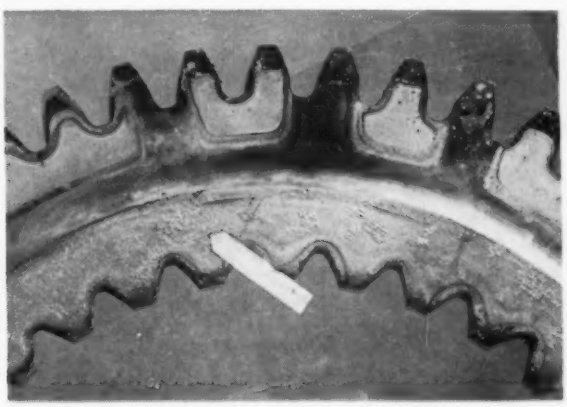


Fig. 3—Good cleaning before copper plating is essential for adequate stop-off protection. Here, poor cleaning blistered the plate.

while harder areas remain smooth and almost unaffected. In a carburized part having both case-hardened and non-carburized (or "core") areas, the properly cased areas appear bright, while core areas assume a dull finish (Fig. 1).

The thinking behind this test method is linked with the two most common heat treating problems with carburized parts — decarburization and "case leakage". These problems, usually blamed on a copper plate stop-off deficiency, tend to be localized and often occur in areas difficult or impossible to check by standard methods.

After grit blasting for about one minute, you can see both discrepancies in the surface finishes they present. The validity of the visual test is confirmed by sectioning the part so that the affected areas can be checked for hardness and examined microscopically for differences in microstructure. Since carburized parts are normally grit blasted to clean them, this test allows you to "rough" inspect the parts at no extra cost.

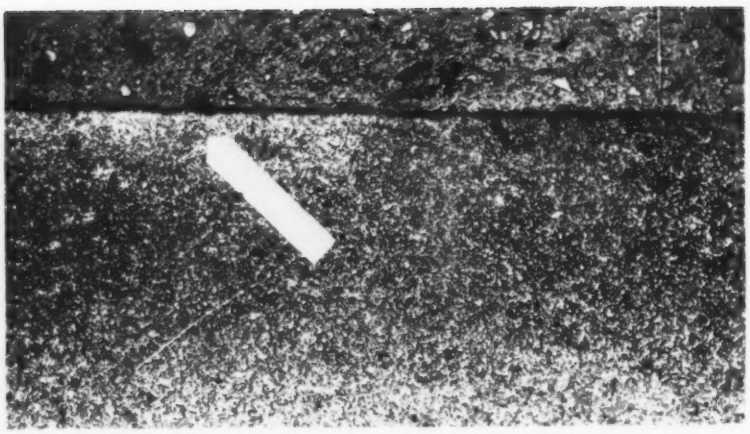


Fig. 5—Micrograph enlarges part of the decarburized case shown in Fig. 4. Magnification is 100X.

"Case leakage" may be defined as the leakage of carbon during carburizing in areas where carburizing wasn't intended. It results from inadequate stop-off protection. When copper plating is the stop-off medium, leakage may result from the plating being too thin, porosity, poor adherence, or removal of the protective plate during machining.

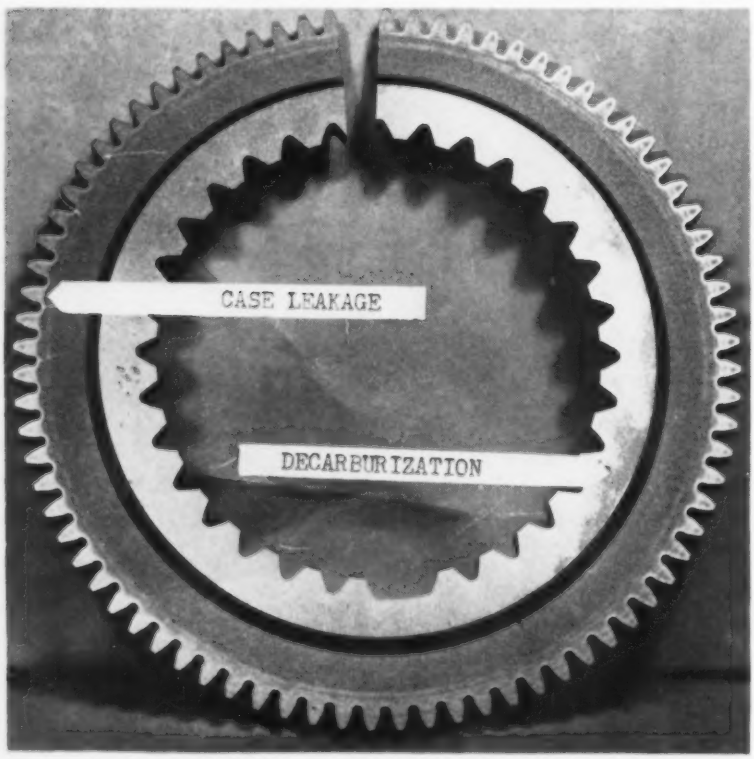


Fig. 4—Grit blasting shows up two deficiencies on the same gear—case leakage and decarburization. Note the differences in surface finish.

Improper deburring is shown in Fig. 2. Note how faulty deburring partially removed the protective copper from the outer gear teeth. Enough was removed to permit case leakage during carburizing. After hardening, the gear was grit blasted, and the areas where leakage occurred appeared bright because of their higher hardness than adjacent areas (Fig. 4).

A large amount of decarburization on carburized parts can occur in the hardening furnace before final quenching. If the part is not cleaned thoroughly before plating, certain contaminants entrap themselves between the plate and base metal and cause poor plate adherence.

Other factors figure in

Even with an endothermic atmosphere supply to the furnace to prevent oxidation of the plate, the contaminated areas will blister (Fig. 3). The contaminants contribute to decarburization in these areas.

Insufficient or porous copper plate also contributes to decarburization since the carbon potential of the hardening furnace atmosphere is much lower than the potential of the carburized case.

Fig. 4 shows a decarburized area which had occurred under blistered plate. The copper has been stripped and the gear grit blasted for emphasis. Note the dull area where faulty plating resulted in decarburization. An enlarged part of this decarburized area is shown in the photo micrograph in Fig. 5.

Steel's major problem—

A New Look At Temper Brittleness

By G. K. BHAT, Metallurgical Engineer,
Crucible Steel Research and Development Laboratory, Pittsburgh

Temper Brittleness: Metallurgy's No. 1 Mystery?

Both metallurgists and design engineers have at least one uncommon problem in common. They would like to improve the mechanical properties of steels for those applications involving critically high stress. But —they would like to clinch this objective without wasting alloy or increasing steel costs.

Right now the pressure for improved, brittle-free steels stems from the needs of defense. The demand is for steels with far better impact resistance. This means steels that can withstand tremendous pounding without either bending or breaking in brittle fracture.

Brittleness — whatever the cause —stands in the way of this objective. Temper brittleness is a prime offender. That is why it warrants so much attention. All of the more commonly used plain carbon and low-alloy steels are subject to temper embrittlement.

Unfortunately, temper brittleness is still something of a mystery. Not even advanced metallurgical research has been able to uncover all of the crucial facts. Many of those unearthed aren't necessarily conclusive.

Here are a few of the key questions still puzzling researchers:

What causes temper brittleness in steel?

Can the trouble be traced to a single microconstituent?

If so, what is the nature of the microconstituent?

Which method for measuring embrittlement is really valid?

How can temper brittleness be overcome?

Last August, The Iron Age published a three-part series* on temper brittleness and the impact properties of steels. These articles, prepared by experts, traced the effects of all major alloying elements, of carbon content, of grain size. The treatment was comprehensive and highly imformative.

But the subject of temper brittleness is not a closed book. There is always another provocative chapter —and then another.

Dr. Bhat's current article poses a number of interesting questions while filling in with at least as many useful answers. Most of the information served up justifies calling it a "fresh" approach.

Did you know, for example, that preheating for welding tends to minimize temper embrittlement? Or that stress relieving—so widely practiced —often promotes embrittlement in welded structures?

Low temperature embrittlement can be readily overcome by a simple, short-cycle heat treatment. But high temperature embrittlement—for reasons still unknown—produces effects that are permanently damaging.

There is now evidence that a grain boundary precipitate may be responsible for this phenomenon. Defining the nature of this boundary phase may be the key to solving the embrittlement problem. If so, it may help unscramble scores of allied problems in engineering design.

* Issues of August 9, 16 and 23.

◆ THE DEVELOPMENT of better steels for high-stress service is of vital interest to both metallurgists and design engineers. To conserve critical materials and avoid increased costs, such steels should preferably be low in alloy. Perhaps most important, they should combine toughness and good impact resistance—especially for service at low temperatures.

Past experience indicates that a combination of superior mechanical properties can be obtained with a tempered martensitic structure. This implies that the steel is in the quenched and tempered condition. Unfortunately, the impact properties of most plain carbon and alloy steels are adversely affected when these steels are tempered or slow cooled in the range of 750°F to the lower critical temperature.

This loss of impact resistance,

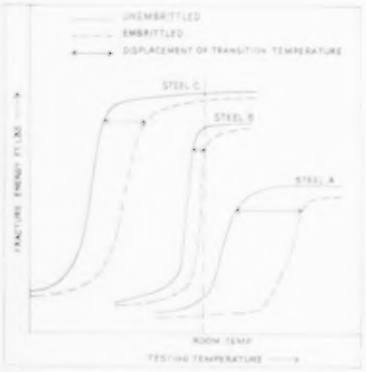


Fig. 1—The effect of embrittling treatment upon notched-bar impact energy and transition temperature is shown for three steels. Relative susceptibility of each steel is compared by noting the displacement of transition temperature to a higher temperature.

accompanied by an increase in transition temperature of ductile-to-brittle failure, is commonly known as "temper brittleness."

For many years, susceptibility to temper embrittlement was measured in terms of the ratio of the impact energy of a specimen water quenched and a specimen slowly cooled from the tempering temperature. The effects of various alloying elements in either increasing or decreasing susceptibility to embrittlement were indicated as a "susceptibility ratio."

Moly decreases danger

Measured in this way, such elements as nickel, chromium, manganese, and phosphorus were found to promote embrittlement. Additions of molybdenum had the opposite effect. Molybdenum, therefore, was added to many steels in order to decrease susceptibility to temper embrittlement.

But with the occasional failure of molybdenum-containing armor plate and other ordnance components, it was obvious that the problem of brittle failure had not been completely solved. Research was then directed toward a better understanding of the physical nature of temper embrittlement.

As early as 1944, there was evidence to indicate that the comparison of results of room temperature impact tests was not a satisfactory method for studying temper embrittlement.[1] The misleading conclusions drawn from the use of susceptibility ratio criteria was also emphasized by Holloman.[2]

Effects on impact energy

The effect of embrittling treatment on the notched-bar impact energy of three steels is shown in Fig. 1. Note that the tests conducted at room temperature do not reveal whether any of the steels is embrittled. The relative susceptibility of each steel to embrittlement can be compared only by noting the displacement of transition temperature to a higher temperature.

Steel A, according to the diagram, is embrittled more than steels B and C when given the same heat treatment. Steel B shows almost no embrittlement. In the transition region, the type of fracture changes from fibrous to brittle as shown in Fig. 2.

Until 1952, it was generally assumed that embrittlement in steel could be produced merely by quenching from the tempering temperature. Then a study was made of the influence of induction tempering on the impact energy and transition temperature of constructional steels.[3] It was found necessary to restrict tempering time in order to obtain a steel essentially free of embrittlement.

On the basis of these findings, iso-embrittlement diagrams for several plain carbon and low-alloy steels were developed. These studies underlined the fact that all engineering steels exhibit susceptibility to embrittlement to some degree. Significantly, the develop-

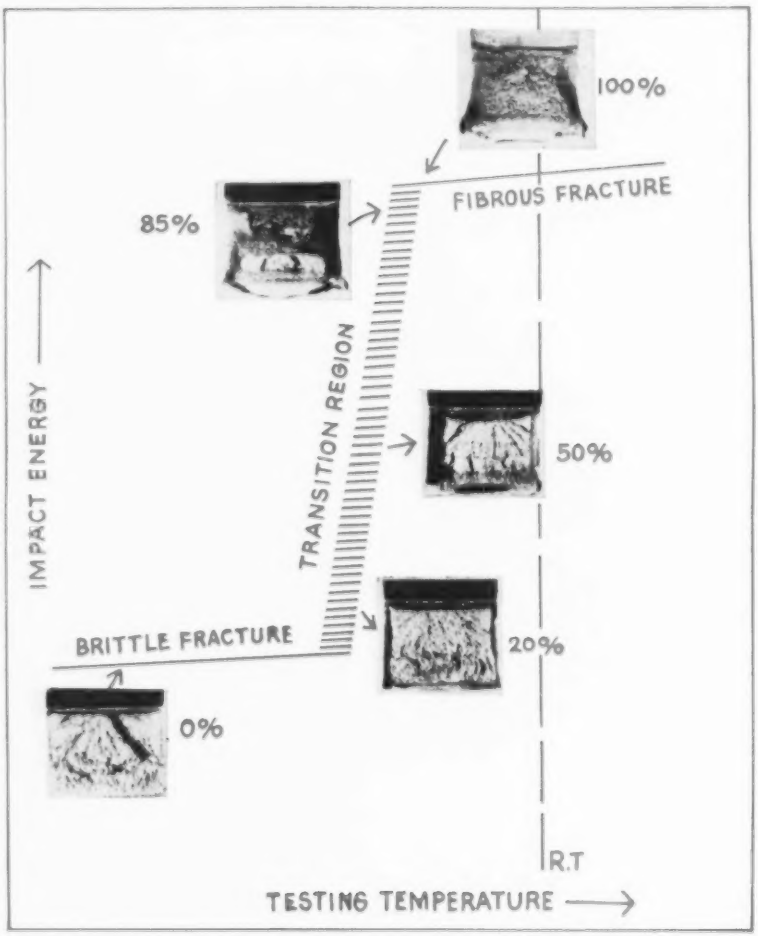


Fig. 2—This graphic presentation shows what happens, and under what conditions, in the transition from a fibrous to a brittle type fracture in steels.

ment of embrittlement during tempering was shown to be an irregular process.

Temper brittleness has no apparent effect on hardness, yield strength, tensile strength, maximum stress, or percent elongation as measured in the tensile test. There is some evidence that the ductility of an embrittled steel, as measured by reduction in area in the tensile test, may be lowered slightly. This condition is accompanied by a longitudinal, rather than cup-and-cone type, fracture.

Strain rate effects charted

Little or no information is available on the effect of temper brittleness on such physical properties as specific gravity, thermal expansion, or electrical and magnetic characteristics.

The effect of a change in strain-rate on the toughness of both embrittled and non-embrittled steel has been measured.[4] Transition temperature is affected by strain rate in either condition, the effect being somewhat greater in the embrittled specimens.

Testing a 5140 steel, it has been shown that endurance limit for both embrittled and non-embrittled material is not appreciably affected at either room temperature or —35°F.[5] Based on these tests and others, it is safe to assume that endurance limit is not affected by factors responsible for temper embrittlement in steel.

Of particular significance is the fact that there are two modes of embrittlement. Low-temperature embrittlement occurs in the range of 700° to 1000°F. Its effects can be eliminated by heating the embrittled steel to a temperature above 1000°F.

Embrittling modes overlap

High-temperature embrittlement begins at about 1050°F and continues upward to the lower critical temperature of the steel. Its effects are permanent. Both modes of embrittlement tend to overlap in the range of 1000° to 1100°F.

Continuous cooling from a high tempering temperature tends to produce a certain amount of both low- and high-temperature embrittlement in low-alloy steels. This type of embrittlement is usually more severe than the maximum produced by isothermal tempering at 900-925°F. When several temper embrittling teratments are applied, however, the net effect in terms of brittleness is not likely to be cumulative.

In welding applications, temper embrittlement can occur in both the weld and the weld-affected zone. Failure of plain carbon steel welds is rather rare. In general, a structure of tempered martensite has maximum sensitivity to temper brittleness. As the microstructure varies from tempered martensite to bainite, pearlite, and ferrite, propensity to embrittlement gradually decreases.

Figs. 3 & 4—Isoembrittlement curves for 5140 (3) and 4047 (4) steels. Figures beside points represent increase in transition temperatures (°F.) based on transition temperature of specimens tempered at 1200°F for 5 seconds. Figures in parentheses are the average hardness of the specimens in that series.

Fig. 3

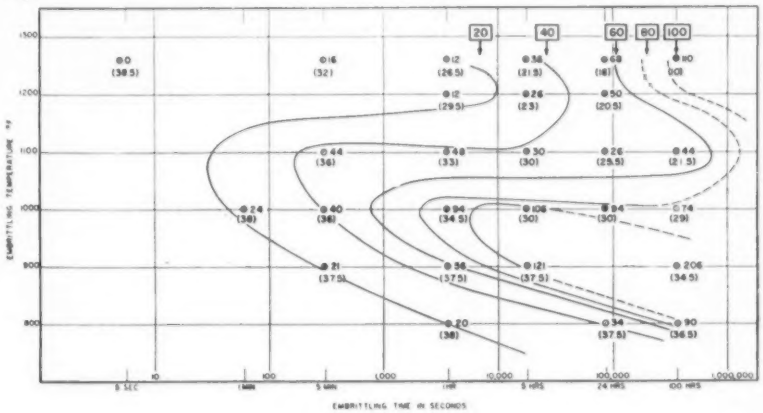
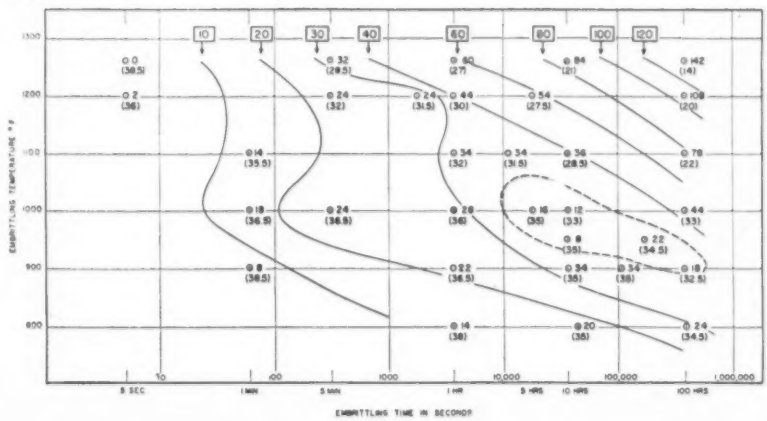


Fig. 4



Preheating minimizes danger

Preheating for welding tends to reduce quench sensitivity by preventing martensite formation. Such practice is known to minimize chances of developing temper embrittlement.

On the other hand, stress relieving often promotes embrittlement in welded structures, particularly in low-alloy steels. To avoid embrittlement, stress relieving tem-

Chemical composition counts most in determining the susceptibility of steels to temper embrittlement

peratures for plain carbon steels should not exceed 850°F. A desirable temperature range for low-alloy steels is 1000-1050°F.

It should be emphasized that these conclusions are based on tests conducted on Charpy impact specimens. In massive structures, the transition temperature behavior may vary to some extent. The overall significance of the laboratory results, however, should not be disregarded.

It should also be remembered that the impact properties of steels are seldom impaired at the embrittling temperatures. Impairment occurs only, if after exposure in the sensitizing range, the specimen or part is cooled to room or subzero temperature.

Examples of temper embrittlement failure can be found in oil refinery stills. But these failures do not occur at operating temperatures. Usually, they occur during shut-down periods following long service. Molybdenum or tungsten are now added to oil refinery still materials to reduce embrittlement susceptibility of Cr and Cr-Ni alloy steels.

Effects of alloying elements

Chemical composition is the most important single factor in determining susceptibility to temper embrittlement. Some of the effects of chemical composition have already been studied, at least in part. To obtain a balanced view of these effects, however, it is desirable to develop iso-embrittlement diagrams such as those shown in the accompanying Figs. 3 and 4.

Known effects of the various alloying elements on temper brittleness are summarized in Table 1. This summary applies particularly to medium carbon steels. An increase in carbon content tends to further promote the embrittling effect.

What is the mechanism of embrittlement? To begin with, there are two distinct regions of embrittlement. The cause of embrittlement in each of these regions is not the same.

Electron micrograph findings

Electron micrographs of specimens of 3140 steel embrittled for 100 hours at 1250° and 900°F are shown in Figs. 5 and 6. They offer a number of important clues.

In the specimen embrittled at 1250°F, there is evidence of a constituent precipitating at the ferrite grain boundaries. Attempts are now being made to link high-temperature embrittlement with this grain boundary phase.

The effects of low-temperature embrittlement in alloy steels containing neither Mo or W, can be dissipated by reheating to 1125°-1250°F. Even 10 minutes at 1250°F (1150°F for nickel alloy steels) is usually sufficient to remove most of the effects of low-temperature embrittlement. Longer holding times tend to promote high - temperature embrittlement, the rate and extent of which are independent of previous low-temperature embrittlement.

Prior embrittlement's role

Prior embrittlement at high temperature has a retarding influence on low-temperature embrittlement. It promotes the formation and growth of ferrite grains. It provides a means for reducing embrittlement of susceptible steels and could be adapted to commercial heat treating practice.

An increase in prior austenitic grain size usually increases embrittlement in the low-temperature range. It has little influence on embrittlement in the 1150°-1250°F range. Austenite inhomogeniety, in the form of undissolved carbides prior to quenching and tempering, tends to decrease transition temperature. It also appears to retard

TABLE 1: How Alloying Elements Affect Susceptibility To Embrittlement

ALLOY ELEMENT	Susceptibility As Determined By Displacement Of Transition Temperature	
	Low Temperature Range 800° to 1000°F	High Temperature Range 1100°F to Lower Critical Temperature
Chromium	Increases markedly	Increases moderately
Molybdenum	Reduces susceptibility of most steels	Increases moderately
Manganese	Increases markedly	Increases moderately
Nickel	Increases severely in steels not deoxidized with aluminum	Increases moderately
Boron	Increases markedly	Increases moderately
Tungsten	Reduces susceptibility of most steels	Increases mildly
Vanadium	Increases slightly	Unknown
Titanium	Increases markedly	Unknown
Aluminum	Increases slightly	Unknown
Nitrogen	Increases slightly	Unknown
Antimony	Increases very markedly	Unknown
Arsenic	Increases slightly	Unknown
Nickel & Chromium	Increases markedly	Increases moderately
Chromium plus Molybdenum	Increases slightly	Increases moderately
Nickel & Chromium & Molybdenum	No increase	Increases moderately

the rates of both high- and low-temperature embrittlement.

There is some evidence to indicate that low-temperature embrittlement may be associated with segregation of solute elements to the prior austenite grain boundaries. As tempering time at temperature is increased, segregation at the ferrite grain boundaries occurs.

The cause of high-temperature embrittlement is still pretty much a mystery. It may be due to phase precipitation at the ferrite grain boundaries. Removal of low temperature embrittlement upon reheating could be connected with solute atom movement away from prior austenite grain boundaries and their redistribution in the matrix.

These palliatives help

But though considerably more investigation into underlying causes appears in order, more is known about practical palliatives which can be applied. Among these, adding small amounts of either molybdenum or tungsten is already becoming normal practice in Russia. Promoting austenite inhomogeneity or treating with a preliminary short-time high-temperature temper are other useful approaches.

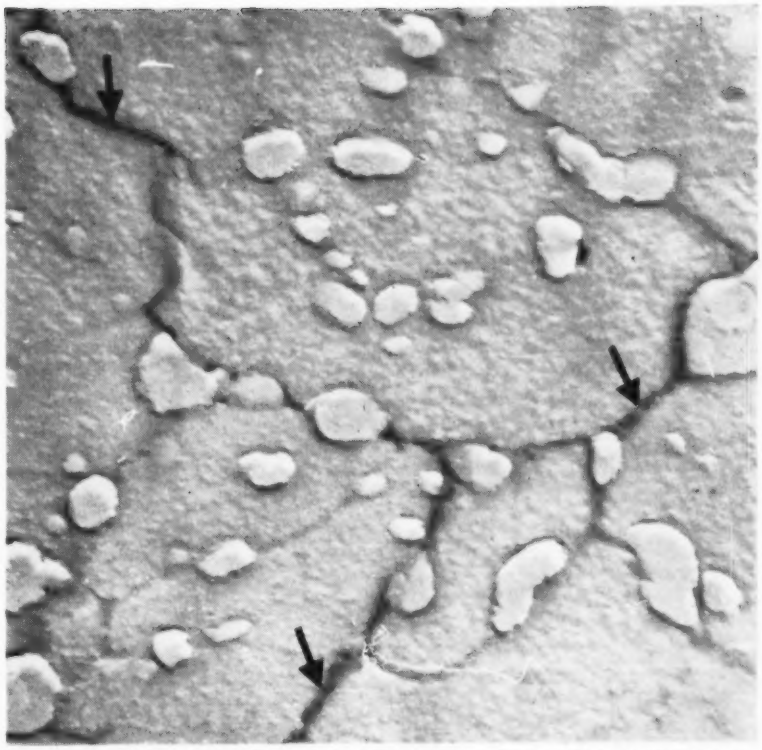


Fig. 5—Could this be the answer? At high magnification (19700 X), electron micrograph of 3140 steel points up the presence of a phase at the ferrite grain boundaries after 100 hours at 1250°F.

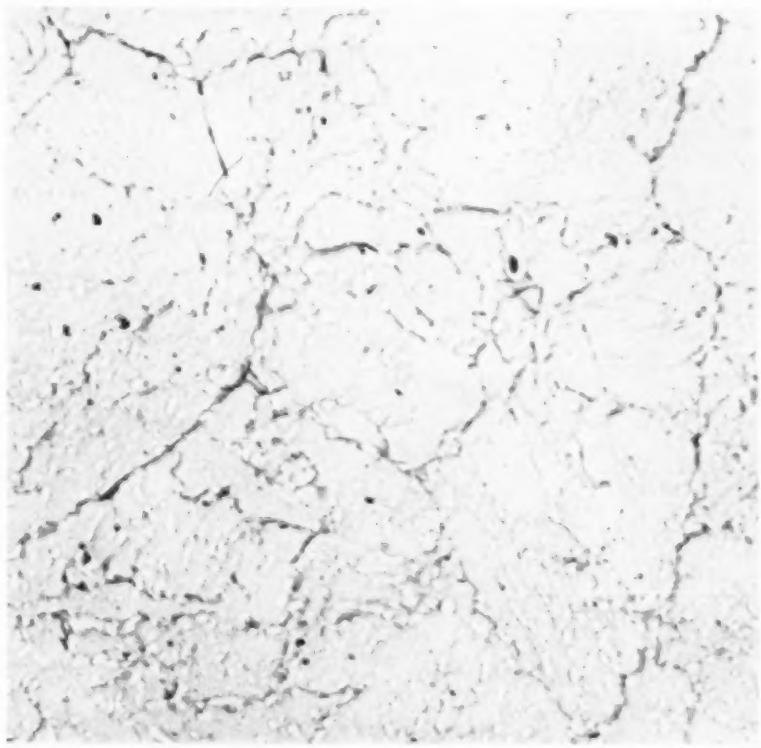


Fig. 6—Another electron micrograph (6600X) of the same alloy grade, 3140, shows clean prior austenite grain boundaries. This specimen was embrittled for the same time (100 hours) at 900°F.

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Guard eyesight, especially—

Emphasize the "Human Element" for Better Inspection

By E. J. EGAN, JR., Machinery Editor

◆ Magnetic-particle and fluorescent-penetrant inspection of metal parts is serious business . . . Especially where undetected tiny flaws could lead to tragic failures in service . . . The inspector is the key element, but he's human, after all.

◆ This Magnaflux and Zyglo inspection staff credits its efficiency to "eye-reliability". . . Basic good vision and good training help a lot, but personnel know they must avoid eye-strain at all costs . . . Result is, they pace themselves.

AS a first step toward "eye-reliability," all applicants for inspection jobs must take an eye test.

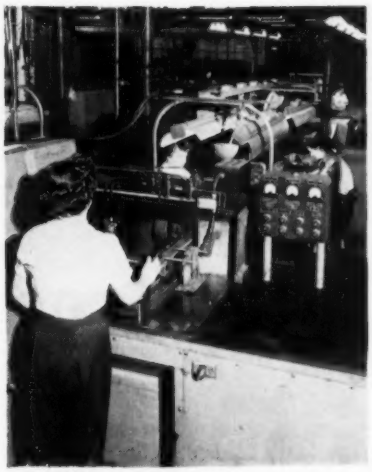
◆ REDUCE THE CHANCES for human error and increase the efficiency of magnetic-particle and fluorescent-penetrant inspection. This theory is routine practice at Avco Mfg. Corp.'s Lycoming Div., Stratford, Conn.

Aircraft engines and components are the chief products at this plant. Duty of the 60-member Magnaflux and Zyglo inspection staff is to spot every possible defect in critical parts before they go into an engine assembly.

It's not what you'd call an easy job. Magnetic particles and penetrating fluorescent fluids, properly handled, will reveal the tiniest of surface flaws. But it takes a well trained inspector with good eyes to observe and make note of them. That's why Lycoming management puts so much stress on what it calls "eye-reliability."

Instrument tests eyes

Applicants for these inspection jobs soon learn just how important good vision is. Each must pass a stiff eye exam even before the formal interview that rates other job qualifications. The eye test given by the plant's own medical staff conforms to Air Force requirements and involves the use of a Bausch & Lomb Ortho-Rater. Minimum acceptable vision is 20-30 in both eyes, either corrected or uncorrected.



GIRLS switch jobs on this conveyorized Magnaflux line to give eyes a rest. One in foreground feeds parts to magnetizing unit; the two seated inspect parts coming along.

Applicants who are accepted on the basis of this test and a formal interview then receive intensive training in Magnaflux and Zyglo inspection theory and practice. This involves study of several basic textbooks, plus closely supervised on-the-job training. Trainees must also pass comprehensive written examinations before they are certified as full-fledged inspectors.

But initial good vision and good training still aren't enough. The firm's goal is 100 pct inspection efficiency, therefore continued and unrelenting emphasis on eye-reliability is a "must."

Make job interesting

Management, realizing that inspectors are human, does everything possible to see that their jobs are made comfortable and interesting. Above all, every effort is made to see that good vision stays that way.

For example, great care is taken to avoid eye fatigue. Inspection benches are fitted with special fluorescent lights and spotlights to supplement normal plant-area lighting. And magnifying devices are always within easy reach, just in case a suspected defect needs enlarging to "make sure."

There is another, and probably more important, consideration given to the human side of the inspection job. This is the practice of allowing inspectors to set their own pace. It stems from the realization that (1) eyestrain can and will occur despite all the illumination aids that are provided, and (2) final responsibility for avoiding such strain rests with the inspectors themselves.

Change jobs often

At intervals during the day, usually by mutual agreement, inspectors will stop examining workpieces and switch to less fatiguing jobs. Some will prepare workpieces for inspection, others will stamp approved parts for further processing. In turn, personnel who have been doing these other jobs will assume actual inspection duties.

The net result of this trading-off of departmental tasks is beneficial to all concerned. It brings management faster inspection plus the assurance that good eyes are alert to every possible part defect. It brings inspectors relief from boredom and eyestrain, also.

Equally important is the fact that job trading boosts the pride that inspectors take in their work. All are confident that, because of their excellent training, they can handle any of several duties in a capable manner.

How's Your IQ?
(Inspection Quotient)

Here are some of the exam questions Lycoming trainees must answer before they can be certified as inspectors:

What is the principle of magnetic-particle inspection?

What is permeability?

Why are parts inspected in more than one way?

What are the names and causes of four common casting defects?

What happens when the magnetic field in a part is broken?

What is circular magnetism and how do defects appear?

Why is direct current used for magnetizing?

What are the two types of magnetic inspection used?

On what parts is fluorescent-penetrant inspection used?

Is complete removal of surface penetrant oil necessary?

What is the purpose of the developer?

How is the developer applied to the part?

TRAINEE (left) in Zyglo inspection booth receives on-the-job instruction from his foreman as a supplement to text book study.

With less oxidation—

Hard-to-Braze Alloys Behave in Vacuum Setup

By W. G. PATTON, Engineering Editor

◆ Where oxidation and fluxing problems make brazing difficult, brazing in a vacuum might be the solution . . . It keeps metal surfaces clean and reduces the amount of flux you have to use.

◆ Vac-Hyd Processing Corp. built its own vacuum furnace to prove that tricky, highly alloyed metals could be brazed successfully . . . Now the unit is busy every day with experimental and production jobs.

WITH furnace shell removed vacuum retort can either be cooled or pumped down while it rests in this movable carrier.

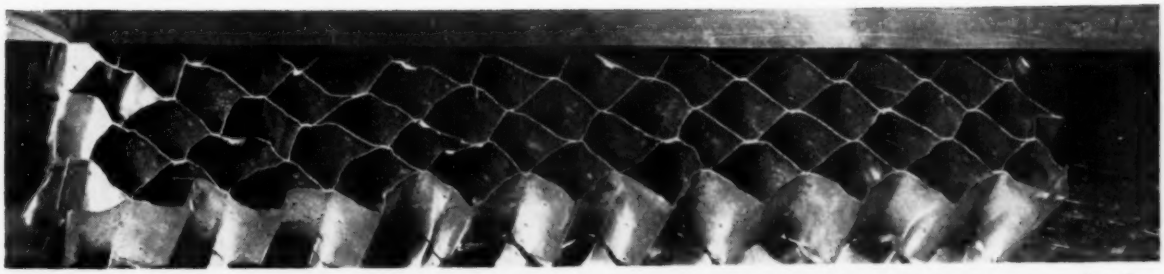
◆ WILL VACUUM DEGASSING and vacuum brazing make possible greatly extended use of high temperature alloys? Can we braze these alloys without fluxes? Will we be able to use freely (as a result of vacuum degassing and brazing) highly alloyed metals that have long defied efforts to use them commercially?

To each of these questions, the answer of the Vac-Hyd Processing Corp., Highland Park, Mich., is an emphatic "Yes." The company's engineers and metallurgists designed and built a 1000 lb vacuum furnace for their own plant, which is now serving most of the major aircraft firms and many other companies.

A substantial amount of automobile gas turbine experimental work has found its way to the Highland Park shop. Employees have been working two shifts or more to keep up with demand, and a soon-to-be-completed expansion program calls for a second furnace. It will also be used for vacuum degassing, annealing and brazing, or for dry hydrogen brazing.

In addition to experimental work for the aircraft and automotive industries, Vac-Hyd also does short-run production work. This includes vacuum annealing, degassing and brazing of high temperature ferrous and nonferrous alloys and titanium.

For example, R. F. Gunow, the firm's president, reports brazing diesel engine turbocharger components successfully in vacuum. Another application involves vacuum annealing of automotive in-



Typical honeycomb structure of thin stainless steel prior to vacuum brazing.

strument parts. This improves their electrical properties by removing hydrogen and other gases.

One of the shop's degassification jobs calls for removing dissolved hydrogen from gas turbine blades made of titanium. Under vacuum, hydrogen content of the blades is cut from 200 parts per million to less than 50 parts per million. A maximum of 125 parts per million is specified.

As Gunow sees it, vacuum brazing and vacuum degassing offer a new approach to many old metallurgical problems. He sums up the potential of vacuum processing this way, saying that it:

1. Develops greater use of high temperature and special alloys and critical materials. Titanium, Inconel X, A-286, R-255 and similar materials can be brazed in vacuum.
2. Improves the electrical and mechanical properties of many highly alloyed materials.
3. Offers cleaner heat-treated metals, thus minimizing fabrication problems.
4. Permits brazing of intricate, honeycomb-type structures.
5. Increases the range of bonding alloys used for brazing. At the same time, it reduces the amount of flux needed.
6. Permits joining very thin sections to thick sections without excessive warpage.

Saves some worries

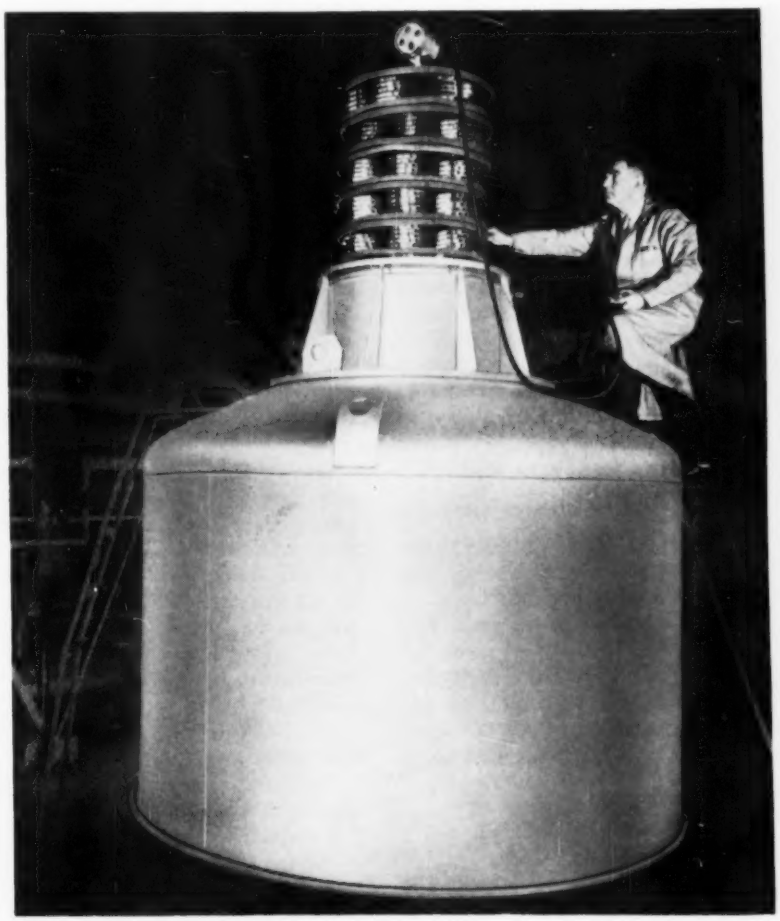
The metallurgical advantage of vacuum brazing is this: It eliminates any concern that, because of back pressure or lagging gaseous diffusion, a hydrogen atmosphere may not penetrate the deeper inner recesses of parts to be joined. It also minimizes the problem of flux not reaching desired locations, or of excessive flux causing burnout or corrosion. Naturally, it reduces flux removal problems as well.

Vac-Hyd metallurgists argue this way: If oxidation is prevented in normal brazing, a flux is not required. Wetting of the base material will occur and a joint can be made. A vacuum reduces this oxidation problem, by keeping the metal so clean that little or no oxide can form. Joining can then be accomplished even under difficult conditions.

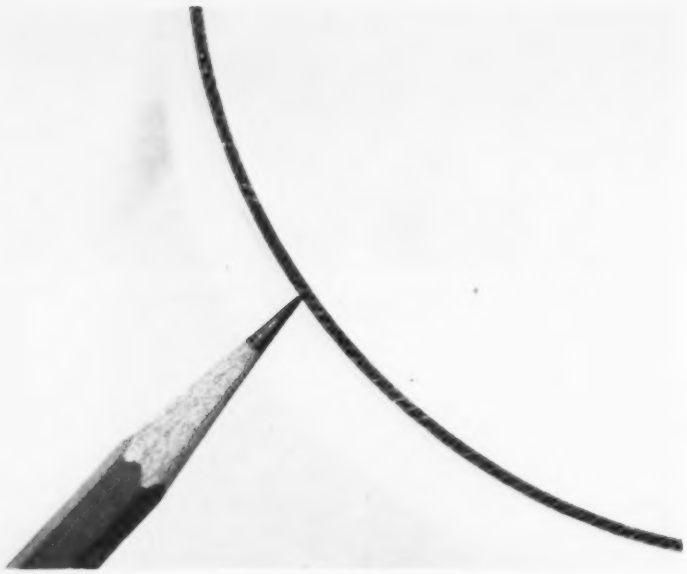
Proof, they say, of the soundness of vacuum brazed joints are reports of increases up to 50 pct in tensile and fatigue strength.

Silver, copper and nickel alloys can be used as bonding materials where the work is done under vacuum. Easy flow of brazing material is an outstanding characteristic of vacuum brazing, where temperatures as high as 2150°F are used.

Heat exchangers, made of thin-



WHEN retort is positioned inside furnace shell, work to be brazed, annealed, or degasified is dropped in from above.



OVERALL thickness of vacuum brazed sandwich structures ranges from 0.035 in. to ½ in. or more.

wall tubing, can be vacuum brazed. In fact, exchangers using metal only 0.002-in. thick have been processed. Another potential application, still experimental, is hollow turbine blades. Still another use is brazing blades to wheels. And a fabricated and brazed, hollow air-cooled turbine vane made from titanium also shows promise.

Corrugated and honeycombed structures offer a bright potential for vacuum brazing, too, particularly where very thin sheet metals are used. The need for metal surfaces of aircraft to have high temperature resistance is increasing steadily.

Substitute brazed stainless

Strong, rigid, sandwich-type structures are no answer to this problem. Light, thin stainless steel or titanium, vacuum brazed, can replace aluminum for some of these applications, it is believed.

Heat exchangers must also operate at relatively high temperatures. For this reason, brazed stainless steel is often specified. Under study are a number of jet engine uses where chamber walls must be cooled.

An accompanying photo shows a typical sandwich structure made by vacuum brazing very thin sections of highly alloyed, temperature resistant materials. Overall thickness of these sandwiches may vary from as little as 0.035 in. to ½ in. or more.

Vacuum heat treating is also done in the Vac-Hyd furnace to remove hydrogen and other gases from a wide range of metals. Nitrogen may be removed, but at a comparatively slow rate. However, hydrogen has been extracted from a turbine bucket in two hours at 1900°F. Titanium blades are treated for four hours at 1300°F to remove hydrogen.

The retort used in the furnace is 30 in. ID. Working height is 40 in.

A mechanical pump and an oil diffusion pump are both used to produce the desired vacuum. To start any cycle, the pumping system usually pulls a vacuum of less than 1 micron. At this point, electric heat is turned on and pressures inside the furnace rise. If excessive gassing occurs, the temperature rise is slowed down to permit development of proper vacuum conditions.

A maximum of 5 microns is usually held during a brazing cycle. For a strictly degassing operation, readings as high as 25 microns may be used. The mechanical pump takes the furnace down to the 25 micron range. At this point, the oil diffusion pump cuts in to help the mechanical pump.

The retort, which is supported at the top while in the furnace, is removable from the furnace and can be pumped down to 25 microns even before insertion. This system is advantageous in that it saves a lot of furnace time. Two retorts are available.

Furnace lining is carefully selected to give desired cooling and heating characteristics.

Resistance-type electric heating elements rated at 250 kw are used. With a 250 to 350 lb load, the furnace temperature can be raised to 2150°F in about 1¼ hours.

Four pyrometers are also used, of which three are attached inside the retort. A Limitrol attached outside the retort prevents overheating of the unit if the load is slow in coming up to temperature.

Maintenance has not been a problem during two years of experimental and commercial work. The longest shutdown, of two days, was due to electrical trouble. This record is considered excellent since the equipment was designed from scratch to carry on work in a new field.

No big secret

And yet there is no great mystery about vacuum brazing. As compared with hydrogen brazing, for example, there is little difference in the mechanics of the two processes. The same capillary flow of bonding material occurs in each. In both cases, also, the method of applying the brazing alloy is about the same.

The fact that at least two large U. S. companies are installing their own vacuum brazing plants indicates growing acceptance of the method.

Another interesting use for this equipment is the simultaneous vacuum coating and brazing of plain carbon steels with nickel base alloy. This provides a strong structure, with surfaces that are corrosion and heat resistant.

A problem yet to be explored is the use of vacuum treatment for metals subject to embrittlement due to pickup of hydrogen and other gases. Springs are one item of interest in this area.

How To Cut Down On Weld Metal Cracking

◆ WELD METAL cracking and porosity are two of the major problems facing today's welding engineers and metallurgists.

Fortunately, practically all steels that industry uses today in quantity are readily weldable without cracking and porosity. The new powdered metal low-hydrogen electrodes are a great help in minimizing these problems, when properly applied.

The major type of cracking in weld metal is hot-cracking which occurs at high temperatures in ferritic deposits. It is promoted by such elements as sulphur, phosphorous, nickel (plus sulphur) and carbon, and is reduced by manganese. Fig. 1 shows typical curves for strength and ductility of a special steel, over a wide range of temperatures.

Phase 1 shows the weld metal as it starts to cool. The outside edges are solid with liquid remaining in the core.

Where cracking occurs

In Phase 2, the specimen is almost completely solid except for liquid films between the dendrites or crystal fingers near the center of the specimen. As cooling progresses, the low melting liquids tend to congregate or be pushed toward the center of the specimen, and the films become thinner, with more pressure exerted on them by the shrinking outside edges.

It's believed that this is when hot cracking occurs.

During phase 3 the specimen is completely solid. Strength of the material increases, with some loss in ductility, as the cooling material approaches room temperature.

Fortunately, carbon and sulphur are not normally present in structural steels in amounts sufficient to cause weld-cracking. However, any excess sulphur present will combine with iron to form FeS (iron sulphide) at 1805°F. This low melting substance collects in grain boundaries and reduces cohesion.

Manganese overcomes this. Present in a free form, it has a greater affinity for sulphur than iron has. And manganese sulphide, unlike iron sulphide, has a melting point higher than steel's.

Silicon, phosphorous, carbon and nickel can all contribute to high-temperature weld-metal cracking, silicon and phosphorous probably acting only by promoting segregation of sulphur.

Carbon's influence is to decrease ductility of the weld metal at elevated temperatures. Nickel, in small amounts, forms nickel sulphide, another low-melting compound like iron sulphide.

Avoid hot-cracking by keeping carbon below 0.25, sulphur and phosphorous below 0.02 each. Materials susceptible to hot cracking can be welded by (1) modifying joint design to minimize weld-metal dilution, (2) using high manganese electrodes such as E-7016 (both powdered metal and conventional) and E-10016 (2 pct Mn), and (3) cooling the entire structure under controlled conditions to minimize shrinkage stresses.

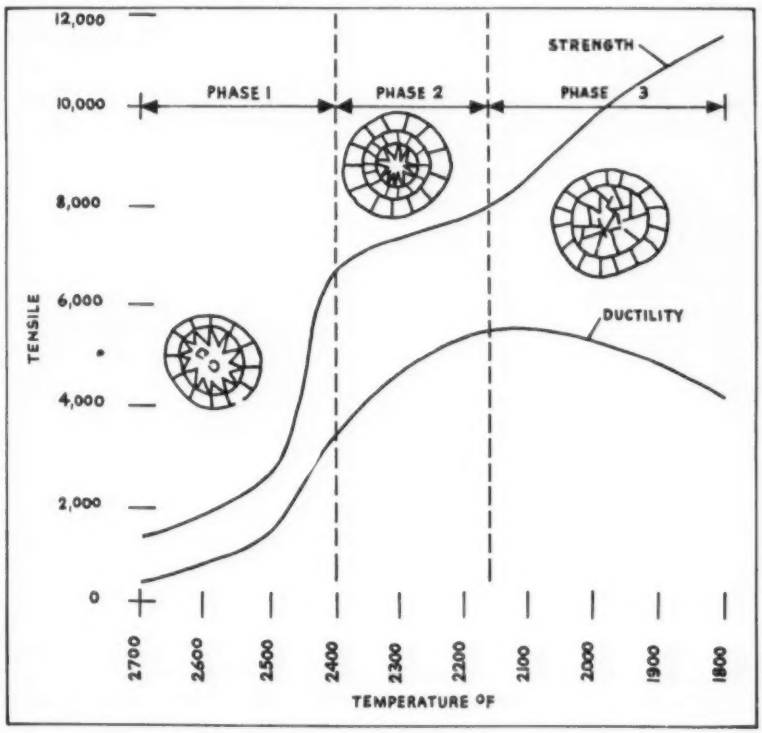


Fig. 1. Strength, ductility curves show this special steel moving through three phases as it cools. Hot cracking is believed to occur in the second of these phases.

AIR CONDITIONED "White Room" permits safe assembly and testing of miniature parts. Tolerances down to 0.0001 in. make the area necessary.

With small assemblies—

Just Any Area Won't Do For Making Small Parts

◆ The trend toward miniaturization points up the need for controlling the environment in the work area . . . Special layout and room construction, air conditioning, rigid work standards —all help to cut rejects and improve the product.

◆ But how do you do all this? . . . Costwise, a lot depends on how you go about it—as this report details . . . You end up with an area suitable for mass production of small parts with tolerances in the millionths.

◆ CONTROL the environment around your work area, and you're bound to get a better product. This just makes good sense. But with the growth of miniaturization, it's more important than ever before.

Making parts and assemblies smaller, more compact, less weighty, has bred problems peculiar to miniaturization. Standing high on the list of troubles are those dealing with the local conditions under which manufacturing and assembly of small parts takes place.

For example, airborne dust can easily include particles larger than 10 microns (about 0.0004 in.) diameter. In such an atmosphere, assembling small components can be more like a racing contest than a precision process. It makes a real difference whether or not dust particles settle on the parts before you assemble them. Comparing dust particle size with assembly tolerances of ±0.0001 in. clearly shows why.

At Miniature Precision Bearings, Inc., Keene, N. H., the problem of environment control is particularly acute. "Miniature bearings are manufactured and assembled to tolerances that are almost, but not quite, impossible," says laboratory manager T. P. Barnard.

"White Room" concept

Surface finish on the bearing balls cannot exceed 4 to 6 microinch, rms. In exacting cases, the finish may be held to 1 to 2 microinch, rms. Assembled parts are fitted to radial play (internal looseness) tolerances as close as 0.0001 in.

Out of the need for such tolerances at Miniature Precision Bearings has grown the concept of the "White Room." The term was picked to emphasize the vital need for cleanliness.

The "White Room" actually is a controlled-atmosphere building

within a larger air-conditioned structure. Carefully isolating the area from the rest of the plant permits a high degree of environment control.

Inside the "White Room" is space for (1) storage of incoming parts, (2) cleaning and assembly, (3) tumbling, (4) inspection, and functional testing, and (5) packaging. This last area is apart from the rest. Quality control offices and the gages and standards room also find space in the controlled area, although they are separated from the "White Room" proper. The same standards of cleanliness hold in all controlled areas.

At least 4 cleanings

Finished (but not assembled) parts feed into the "White Room" through one small window. Once inside, they stay until packaged.

Vapor degreasing in batches preceeds storage of parts. Two barium titanate 350-kc ultrasonic transducers work with the vaporized trichlorethylene to insure a good cleaning job.

Parts again undergo cleaning before assembly, this time in filtered solvent. An 18-kc magnetostrictive transducer supplies ultrasonic energy here.

During and following assembly, parts are recleaned at least twice more. To avoid even a hint of contamination, a total of six separate cleaning operations is not unusual. All washes are preceded by demagnetizing of parts. This eases stripping of magnetic particles during the wash cycle.

Cement block interior walls of the "White Room" are topped with three layers of plaster. A waterproof, dust-free plastic covering tightly seals the plastered walls. No open beams, cracks or crevices are permitted anywhere.

Ducts buried in the cement floor carry electrical wiring and other facilities. Vinyl tile covers the entire floor. A rubber dust strip seals wall to floor around the room.

Three airlocks provide access to the "White Room." Within each lock, air pressure is slightly higher than normal atmosphere. Inside the "White Room," air pressure is above that in the locks.

The positive pressure differential creates an outward flow of air at all times. This prevents dust and other contaminants from entering the controlled area.

A gelatinous mat in each airlock strips dust and dirt from passing shoes as workers enter the "White Room." A twice-daily wipedown with solvent keeps the mat clean and tacky.

Personnel permanently assigned to the "White Room" must enter through the main airlock. This lock is considerably larger than the other two, and provides more protection against contaminants. In addition to the tacky floor mat, the area includes clothing lockers and an automatic shoe cleaning and brushing machine.

Employees don a nylon smock and head covering in the main airlock before entering the controlled area. Needless trips or passage through the "White Room" are discouraged. When a worker leaves the area, she removes her nylon smock and cap, and stores them in the main airlock. In this way, the lint-free clothing remains uncontaminated by conditions outside the room.

Employees in the "White Room" must not use pencils, tissues or paper of any kind. They cannot wear wooly or linty clothing beneath the nylon smocks. Personal cleanliness is a must.

Parts must not be touched with the bare hand. Stainless steel tweezers, lambskin gloves, rubber finger cots and rubber gloves are provided. One exception to this exists: Bare hands are allowed in assembling very tiny components. Successful assembly work there requires the sensitivity of bare fingers. Bearings and parts so handled are slushed in fingerprint remover compound, which also absorbs moisture and prevents corrosion.

Workbench tops are sheet Formica molded to the table contours. Storage cabinets if present are enameled steel; they are entirely avoided if possible.

The general furnishing scheme makes removing dust and dirt relatively easy. It also eliminates porous material and fabric that could contribute or retain contaminants. Operators assemble and inspect parts on easily cleaned trays of plastic or stainless steel.

Fluorescent lighting fixtures mount above a false ceiling of plastic sheeting. The plastic ceiling has three advantages: (1) it contributes little contamination, (2) it provides essentially glareless and shadow-free illumination, and (3) it's easy to clean and maintain. Light intensity is 225 foot-candles at table height, adequate for the finest assembly work.

A separate air conditioning system supplies inlet air to the "White Room"; another setup conditions air in the rest of the plant. "White Room" temperature is controlled to 70° ± 2°F. Humidity is kept between 25 and 40 pct, relative. To do this, air is subcooled to lower the dew point, then reheated. When outside atmospheric conditions reduce the relative humidity to 25 pct or below, moisture is added for the comfort of employees.

Stops tiniest particles

Conditioned air, after passing through standard filters, goes through a bank of Cambridge Absolute filters before entering the "White Room." These tightly sealed filters retain particles larger than 0.000001 in. diam.

Length of filter service depends on the air pressure drop across the individual unit. When a sensitive differential manometer shows pressure dropping below a certain level, filters are replaced.

Conditioned air admitted through ducts and flexible tubing moves through perforated metal openings between the plastic ceiling panels. Clean, dry filtered air flows down toward the workbenches, then across the floor to return ducts set in the walls at shoe level. This flow pattern assures that the cleanest air in the environment surrounds the assembly area at bench level height.

Part of the exhaust air is ducted to the main air compressor. After compression there and refiltering, it serves as shop air of the highest cleanliness for the delicate instruments and spray guns.

Maintenance (floor waxing, washing and vacuum cleaning) is carried out only when no assembly operations are going on. A central vacuum system avoids the need for bringing vacuum cleaners into the "White Room."

Men can start sooner—

Let Aluminized Suits Speed Openhearth Repairs

◆ REPAIRING an openhearth furnace generally means not only a shutdown—which is bad enough—but a 24-to-30 hour waiting period for cooling before your men can even set foot inside. The wait is shorter on checker chambers, but still runs from 45 minutes to one hour after access doors are opened.

Phoenix Iron & Steel has satisfied itself that newly-developed protective clothing made of aluminized asbestos cloth can speed the work by permitting workmen to go in earlier.

The material proved itself under emergency conditions, when a recent failure in the bottom of one of its openhearths forced Phoenix to shut down for repairs to the refractory brick. Normally, it would have taken 24 to 30 hours for the furnace to cool from its 2900°F operating temperature to 180°F—about the highest temperature the repairmen on the job could take.

The heavy production schedules didn't permit of this.

PROTECTED by aluminized suit, worker emerges from 500 to 1000°F heat of openhearth checker chamber. He worked inside for 5-minute stretches.

Cuts waiting time

The company called on the Keasbey & Mattison Co., which sent out an aluminum-foil-coated asbestos cloth suit capable of withstanding a 2500°F flame, and of reflecting more than 90 pct of radiant heat. A worker put on the outfit and was able to go into the furnace after only 16 to 18 hours cooling, when the temperature still hovered around the 400°F level. He could have gone in at any point below 600°F, had the suit arrived earlier.

Repairing the furnace called for chipping away solidified steel with a heavy air hammer. The suit didn't impede handling of the hammer, and the workman was able to stay on the job for 10-minute periods without discomfort from the heat. The limited oxygen supply made longer periods impractical.

The test showed that two workmen wearing the suits could go in and make repairs at 300 to 400°F temperatures, within a 24-hour period of the shutdown.

Thus the furnace could be put back in operation in approximately 40 hours, instead of the 48 to 50 hours normally needed. Figuring the production losses of an openhearth undergoing repairs at, say, 10 to 12 tons per hour, savings are substantial.

Phoenix ran additional tests in evaluating the suit's usefulness for openhearth applications. Cleaning checker runners in checker chambers, for instance, normally requires a 45-minute to one-hour wait for cooling. Then a crew of about six men go in alternately—for about one-minute stretches each—to do the job.

With the aluminized suit, one man was able to go into the intensely hot chamber within 4 minutes after it was unsealed. He stayed for intervals of up to 5 minutes before emerging. He did the job alone. Total cleaning time: about one-sixth as much.

Stands 3 ft from door

In a third test, a protectively-clothed workman stood directly in front of, and three feet away from, an open furnace door. He probed the furnace for one-minute with his lance and reported no discomfort from the 2900°F heat. The test has satisfied Phoenix that workmen wearing such suits can perform lancing, emergency repair or other such operations while the furnace is working.

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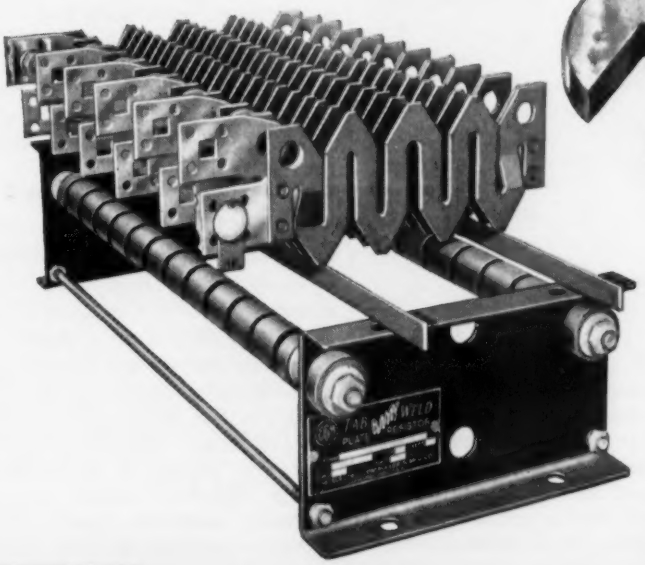

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New Technical Literature:

Catalogs and Bulletins

Steel data

A revised edition of a 256-page pocket size data book gives helpful information on machining and fabricating, specifications and tolerances, weights and dimensions, elements and safe loads. Tables, definitions, and general data also included. *Joseph T. Ryerson & Son, Inc.*

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Package controls

Controls that can be installed or adapted within limited space are described in new written matter. The sensory controls direct machines to perform various sequences of simultaneous functions to form complete cycles of operation. *Sensory Inc.*

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Compressors

Small, air-cooled compressors are shown in a 16-page booklet. Both one and two-stage compressors are offered, with working pressures ranging from 85 to 175-psi. Models include bare compressors and those with horizontal and vertical tanks. The latter models are designed for use in limited space. *Gardner-Denver Co.*

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Tractors

How addition of the right tractor job attachment increases production and profit is covered in an eight-page catalog. Shown are tractor-mounted accessories including heavy-duty towing winches, worm drive winches, high speed winches, an oil well servicing winch and a "donkey" hoist. Also presented is a tractor-mounted excavator-crane which can be equipped as a dragline, clamshell, crane, pile driver, shovel or backhoe. *Hyster Co.*

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FOR YOUR COPY

Money-saving products and services are described in the literature briefed here. For your copy just circle the number on the free postcard, page 97.

Diecasting unit

Cold chamber diecasting machines from 200 to 800 tons appear in illustrations and descriptions in a new brochure. A large cutaway view shows construction features. Specifications, standard and optional equipment are covered. *The Hydraulic Press Mfg. Co.*

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Miller throwaway tools

Milling cutters using throwaway carbide inserts allow faster milling at lower cost, according to a folder presently obtainable. It explains how to profit by production economy resulting from use of the tools. Selection data on face milling steel and cast iron is included. *Newcomer Products, Inc.*

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Heteropolymolybdates

"Properties of Heteropolymolybdates" is a 15-page bulletin covering the properties, uses, classification, nomenclature and preparation of heteropolymolybdates. It contains a section on the use of literature on these compounds. These heteropoly anions, it is explained in the bulletin, contain two to eighteen hexavalent molybdenum atoms around one or more hetero atoms. All are highly oxygenated. Examples are $(PMo_{12}0_{40})^{-3}$, $(Fe_2Mo_{12}0_{42})^{-6}$, $(As_2Mo_{18}0_{62})^{-6}$, and $(TeMo_60_{24})^{-6}$, where P, Fe, As and Te are the hetero atoms. *Climax Molybdenum Co.*

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Gear checker

Features of a new automatic-cycle gear checker are listed in a now available bulletin. It describes equipment, operation and capabilities. The checking unit quickly measures and records parallelism, tooth taper and tooth spacing. Readings are automatically and permanently recorded in two colors by a built-in recorder. Accuracy, through a two-channel electronic circuit, is to 0.0001-in. *Michigan Tool Co.*

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Plastic pins

Plastic pins, trimmed and heat sealed, for mounting new plastic nameplates are described in a manufacturer's literature. The pins are molded to the backs of the nameplates and are made long enough (up to 1-in.) so that the mounting may be on sheet metal or other body or panel material. Installation is accomplished by simply pressing the pins into molded or drilled holes. Then, from the back, application of a heated iron quickly trims the pins and seals the nameplates. Plates are injection molded in Butyrate material of any obtainable color. Styrene or other suitable material may also be used. A metallizing process provides gold or silver tones. *V. H. Swenson & Co., Inc.*

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Welding and maintenance

Featuring welding and cutting, a new bulletin deals with mechanization in steel mill mechanical maintenance. It includes discussions on oxygen cutting, electric welding including inert gas shielded processes, and new iron powder electrodes. *Air Reduction Co.*

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Truck batteries

Batteries for use with rider-type electric industrial trucks are covered in a new specifications bulletin. It includes data on battery ratings and capacities, details of design and construction, dimensions, and weights. *C & D Batteries, Inc.*

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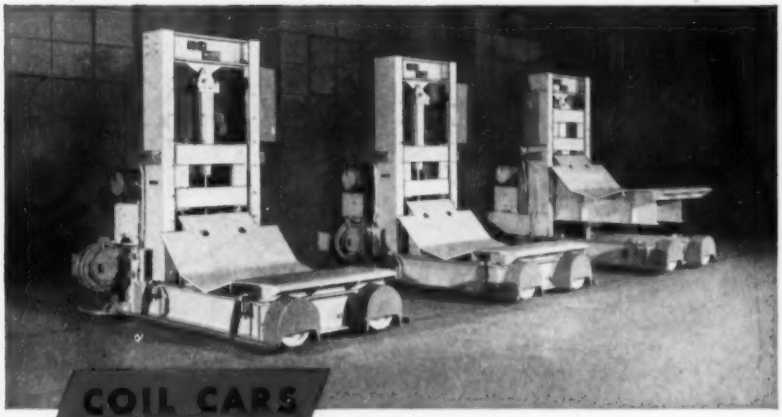

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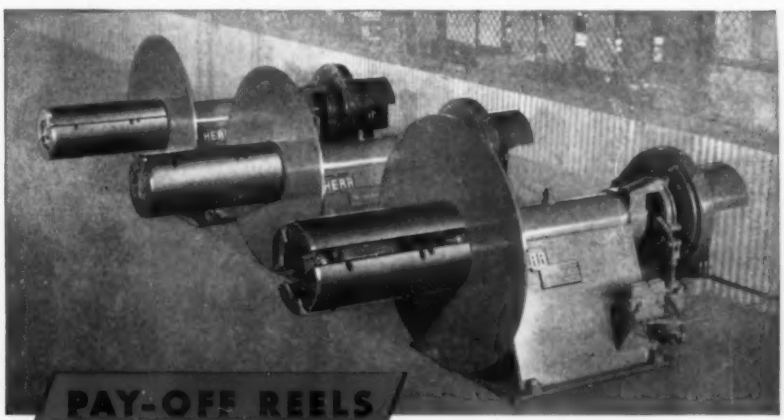

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Regulator Spring Wire
Snake Fishing Steel
Stapling Wire for Preformed Staples (Flat)

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Bee Wire
Bonnet Wire
Bookbinder Wire
Broom Wire
Clip Wire
Dent Spacer Wire
Drapery Pin Wire
Florist Wire
Fuse Wire
Glass Netting Wire
Hairpin Wire
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Pin Wire
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Stapling Wire
Stapling Wire for Preformed Staples
Stone Wire
Weaving Wire
Weaving Wire for Fly Screen Cloth
Wissco Iron Wire

HIGH CARBON FINE AND SPECIALTY WIRE
Aircraft Cord Wire
Armor Wire
Belt Hook Wire
Bobbin Ring Wire
Brush Wire (Tempered and Untempered)
Brush Wire (High Strain)
Chrome Vanadium Spring Wire
Core Wire (Aluminum Cable Steel Reinforced)
Curtain Spring Wire
Flexible Shaft Wire
"Gamma" Spring Wire (Upholstery Spring Wire)
Zig Zag Wire
No-Sag Wire
Hat Wire
Heddle Wire
Hose Reinforcement Wire
Hose Wire, Mechanical
Hose Wire, Vacuum and Defroster
Rope Wire
Signal Corps Wire
Spoke Wire
Hard Drawn Spring Wire
Oil Tempered Wire
Spheroidized or Annealed Spring Wire
Tire Bead Wire
Valve Spring Wire

MANUFACTURERS LOW CARBON COARSE WIRE
Bag Tie Wire
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Box Binding Wire
Brush Handle Wire
"Cal-Tie" Wire
Can Key Wire
Case Hardened Ball Wire
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Clamp Wire
Clothes Pin Wire
Concrete Wall Reinforcement Wire
Garment Hanger Wire
Hay Baling Wire (Coiled)
Lingo Wire
Lintel Wire
Loop Wire
Merchant Quality Wire
Pail Bail Wire
Rivet Wire
Stapling Wire
Strand Wire
Tying Wire
Welding Wire
Wissco Iron Wire
Industrial Quality Wire
Cold Rolling Quality Wire
Heading, Forging or Roll Threading Quality Wire
Medium High Carbon Wire

CF&I-WICKWIRE WIRE

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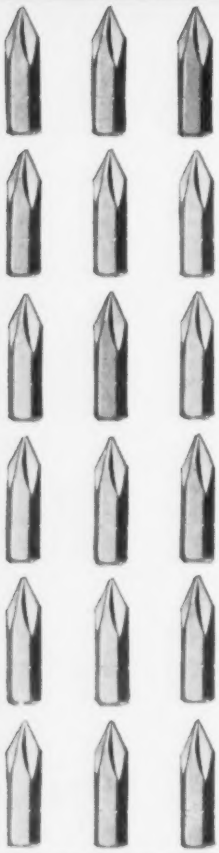
4239

eighteen identical APEX insert bits...



Here are eighteen Apex 440-2 insert bits for No. 2 Phillips recess.

Each bit fits perfectly into the screw head recess, gets a firm purchase to drive the screw smoothly and easily.

Every bit is precision-built of special shock-resisting steel, and is notched at the hex corners to accept the patented bit retaining ring found only in Apex bit holders.

...for eighteen different screwdriving jobs

These eighteen Apex insert bits are identical, except that each one has been hardened through one of three basically different heat treatments, then tempered to meet one of eighteen totally different application requirements. These varying degrees of tensile strength and Rockwell C hardness provide the proper combination of toughness and hardness, insure greater resistance to impact, fatigue and wear. That's why Apex bits last longer, drive more screws, help reduce screwdriving costs.

Selection of the correct Apex bit for a specific screwdriving application is controlled through the complete records Apex maintains on each customer's requirements. You can select Apex insert bits exactly tailored to your requirements, to drive Phillips, Frearson (Reed & Prince), Slotted, Clutch Head or Socket Head screws. Apex—the authority on fastening—offers a complete range of screwdriving tools for manual or power operation. Write on your company letterhead please, for Catalog 21.

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THE APEX MACHINE & TOOL COMPANY

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FREE LITERATURE

Automotive machines

Radial draw formers, offering a 200-pct increase in the production of automotive body parts and molding, are described in a four-page brochure. Automatic high speed machines producing complex auto parts at rates of 400 to 800 parts per hour are illustrated. *The Cyril Bath Co.*

For free copy circle No. 12 on postcard p. 97

Sprockets

Top quality sprockets, with shear pin protection, are now available from stock in a new "off-the-shelf" roller chain shear pin sprocket program. A folder just published gives information and tables listing stock sizes, torque ratings, hub dimensions, and keyseats. Examples for selection and "problem and solution" instructions are detailed. Roller chain shear pin sprockets prevent damage from jamming and other overloads and by shearing often signal impending trouble. According to the folder, here's how roller chain shear pin sprockets work: Shear pin hub is keyed to shaft and is separate from sprocket, with torque transmitted from sprocket to hub by a shear pin. When an overload occurs, the necked pin shears at an exact calculated value and disconnects sprocket and hub. *Link-Belt Co.*

For free copy circle No. 13 on postcard p. 97

Induction heating unit

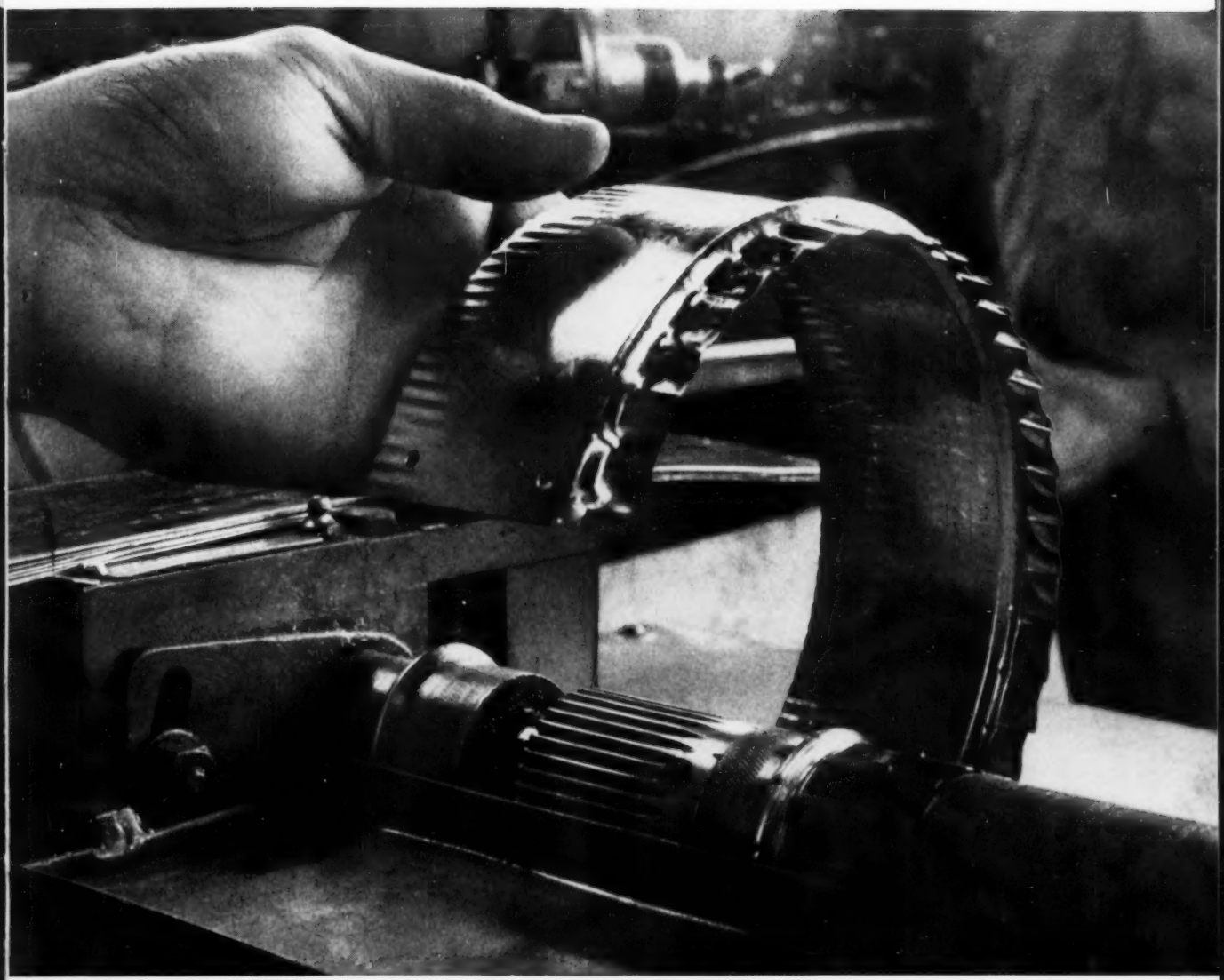
Data on operation, construction, and general features of a new Hobart 400 cycle induction heating unit as controlled by an electronic strip chart program controller is contained in a four-page data sheet. *Industrial Div., Minneapolis-Honeywell Regulator Co.*

For free copy circle No. 14 on postcard p. 97

Parts washer

Production line parts washers are detailed in a new publication. The two-page literature covers washers of the needle-spray type with multiple air jets for solvent removal and parts drying. Using a chain drive for parts movement, they handle up to 1000 an hour. *Gear-O-Mation Div., Michigan Tool Co.*

For free copy circle No. 15 on postcard p. 97



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You come across that thought a lot when you talk with users of Weirkote zinc-coated steel.

Ask *why* they're so sold and you hear that Weirkote gives a better job at *lower* cost. Weirkote fabricates easily. Takes the toughest crimping, bending, twisting, lock seaming, the deepest draws. Its tight zinc coating stays on for keeps.

With Weirkote zinc-coated steel there's no need for costly protective plating, painting or redipping after fabrication. Makes a good-looking job anyone can be proud of. And it stays that way.

Weirkote is continuous-process zinc-coated steel at its best—highly resistant to corrosion, heat and noise. Cost from sheet to finished product is low.

Send for Weirkote Booklet

Look into Weirkote for added efficiency, economy in your operation. For free booklet, write today to Weirton Steel Company, Dept. A-3, Weirton, West Virginia.

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Here's what steel Kaiser

COMPARATIVE ENDWALL TRIAL "... had inspected walls day prior to accident and noted Kaiser Periclase Chrome Metal Encased Brick sections were plumb, in line and tight whereas competitive sections were bowed and leaking."

BACKWALLS "... having tremendous success with Kaiser Chrome Periclase Brick in backwalls ... on rebuild, gave instructions to leave it in for another campaign."

HOT TAP HOLES "... averaging between 20 and 25 heats with Permanente 165 on the 300-ton furnaces, where competitive mix previously gave 3 to 5 heats."

ENDWALLS "... Panels of Kaiser Periclase Chrome Metal Encased Brick went 402 heats while competitive panels in the same campaign were replaced at 265 heats."

BOTTOM PERFORMANCE "... Permanente 165 bottom has tapped 413 heats with delay figure of 3 minutes while competitive bottom - rammed five days earlier - has tapped only 360 heats with an average delay figure over bogey of 11 minutes."

ENDWALLS "... Furnace finished its third campaign using Kaiser Periclase Chrome Brick endwall for a total of 562 heats. Other furnaces using competitive brick usually lasted only 200 heats - one campaign."

industry users are saying about Basic Refractories

One of the most significant things about these statements from Kaiser Chemicals customers is that each of them illustrates a *new performance or production record* made possible by changing to a Kaiser Chemicals basic refractory product.

Why this uniform superiority?

Kaiser Chemicals refractories are *especially designed* for peak performance in specific applications in open hearth and electric steel furnaces. Each is a specially-developed composition . . . each is backed by more than 15 years of continuous research and development.

The uniform composition of Kaiser Chemicals refractories—your guarantee of dependability—is assured by Kaiser Chemicals fully-integrated facilities, controlling quality from initial production of sea water magnesia to assistance in final installation at your mill.

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Kaiser **CHROME-PERICLASE** Brick
Permanente 165 Ramming Mix
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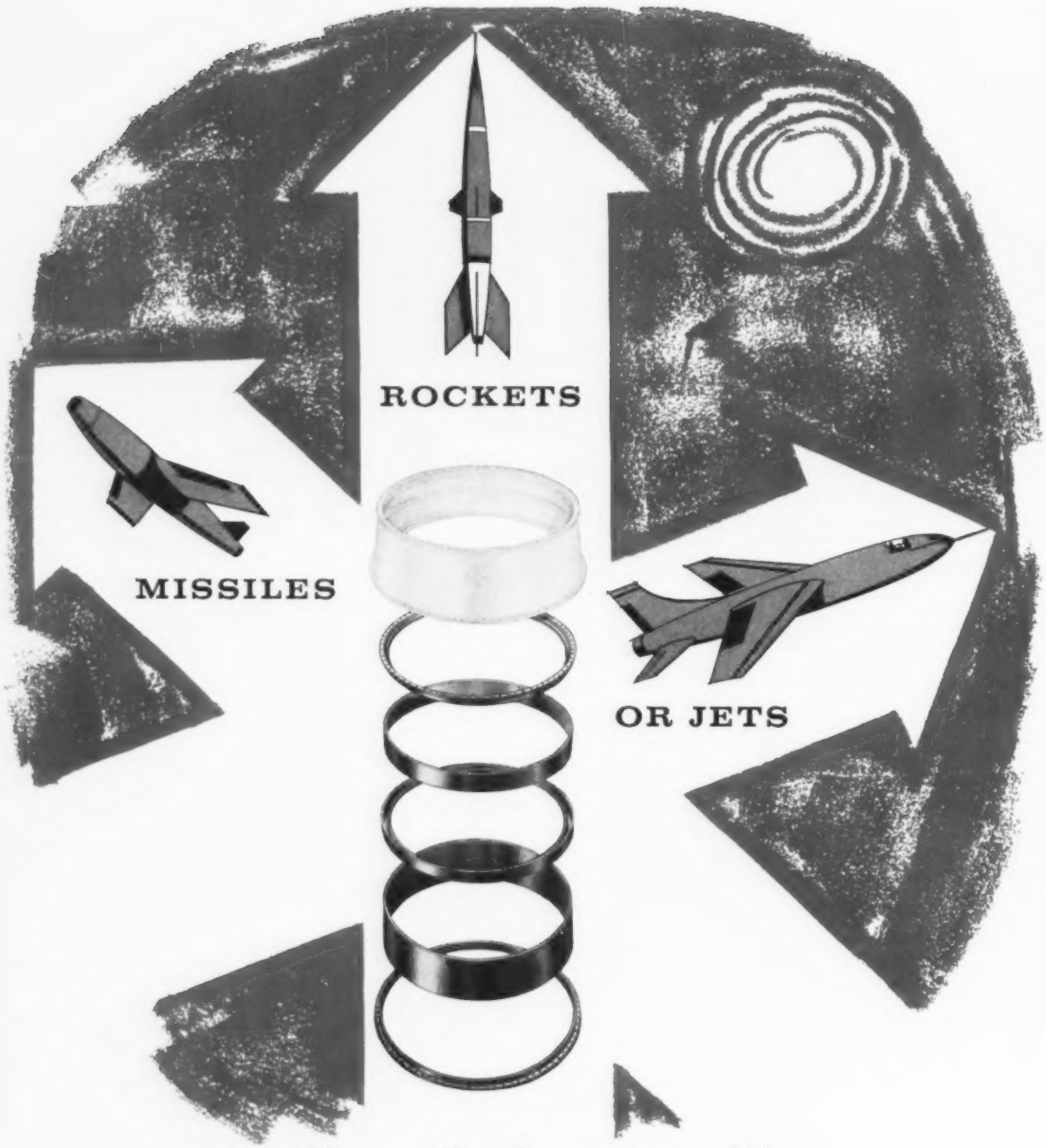

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The manufacture of today's supersonic jets, missiles, and rockets has placed a burden on the prime contractor. He must be concerned with the ability of hundreds of subcontractors to produce components to the rigid quality demanded by aircraft specifications.

American Welding is proud of its record as a supplier of flash-welded rings and components to major United States jet engine manufacturers. Let Amweld's Industrial Products Division study your problem in circular welded components. Your production, too, can be "well on its way with Amweld."

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The World's Leading Manufacturer of Welded Rings

FREE TECHNICAL LITERATURE

These publications describe money-saving equipment and services . . . they are free with no obligation . . . just circle the number and mail the postcard.

This section starts on p. 88.

Inclining device

An illustrated bulletin supplement introduces a fast-acting air motor inclining device available on one company's open back inclinable presses (45 to 200 ton models). Described is a simple, safe, air motor mechanism. It inclines or brings the press upright in approximately two minutes. *Niagara Machine & Tool Works.*

For free copy circle No. 16 on postcard

Turks head

Turks heads are illustrated in a new two-color catalog. It contains basic technical information, principles of operation and advantages as a precision production machine. The booklet explains many typical wire shaping applications. Profusely illustrated, it details outstanding features of the turks heads and includes specifications of types, sizes and technical operating data. *Fenn Mfg. Co.*

For free copy circle No. 17 on postcard

Stainless steels

An eight-page data sheet on chromium - nickel - manganese stainless steels types 202, 204 and 204L is now ready. It gives information on intergranular corrosion, mechanical properties, analysis, and stress rupture properties. Types 202, 204 and 204L represents a new family of austenitic stainless steels which possess very desirable mechanical and corrosion resisting properties, it says. They correspond to the chromium-nickel types 302, 304 and 304L, but use substantially less nickel. *Allegheny Ludlum Steel Corp.*

For free copy circle No. 18 on postcard

Metal removal

A torch for metal removal is the subject of a four-page folder. It details a particular process and the use of the torch for cutting, gouging, beveling or grooving all metals. The literature features numerous new applications for the torch, and also includes data on electrodes. *Arcair Co.*

For free copy circle No. 19 on postcard

Direct current

Containing 40 pages, a new pocket-size booklet contains information on dc power. It explains how, though ac is more widely used, dc is coming up fast in today's power picture. The booklet lists rectifiers and transformers for converting commercially available ac to dc. It is well illustrated and easy to understand. *A. O. Smith Corp.*

For free copy circle No. 20 on postcard

Throwaway tools

Technical bulletins now available cover latest additions to a "no-grind" line of throwaway tooling. The tools are basically 30 and 45° chamfering tools. These may also be used for a variety of other operations and are well suited to gang set-ups. *Wesson Co.*

For free copy circle No. 21 on postcard

Drill stop

An improved drill stop with a new micrometer depth adjustment for drilling and reaming applications is described in a bulletin recently issued. Diagrams and photographs describe the construction and use of the new tool. *Scully-Jones & Co.*

For free copy circle No. 22 on postcard

Postcard valid 8 weeks only. After that use own letterhead fully describing item wanted. 1/24/57

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31	32	33	34	35	36	37	38	39	40
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Bolts

Forged T and T slot bolts are the subjects of a new four-page catalog. It describes features of these bolts and provides charts giving information on types and sizes for all shop requirements. These bolts are two to three times as strong as ordinary soft forged bolts, it states. *Jergens Tool Specialty Co.*

For free copy circle No. 23 on postcard

Cable installation

Installation practices for one company's interlocked armor cable systems are pictured in a 36-page booklet. It shows terminations and splices; connections to switchgear, motors and plug-in bus; special installation problems, and typical installations. Before and after illustrations show the older wiring system side by side with the new interlocked armor cable system. *Wire & Cable Dept., General Electric Co.*

For free copy circle No. 24 on postcard

Computer

For firms with widespread distribution the Univac 120 punched-card computer is an invaluable asset in analyzing actual and potential sales in each location. So concludes a new booklet on how to harness the profit-power of electronics. It is capable of 360,000 additions or subtractions an hour in the computing unit, 72,000 multiplications or divisions. It automatically verifies every internal calculation with no extra program steps or attention from anyone. It can be set up to catch some human recording errors. *Remington Rand Div., Sperry Rand Corp.*

For free copy circle No. 25 on postcard

Gas liquefier

Engineering data on a gas liquefier is contained in a six-page folder now available. It is illustrated with photos and drawings. These show operating cycle and construction. Technical details cover speed, efficiency, yield, motor characteristics, cooling water consumption, weight and size. *North American Philips Co.*

For free copy circle No. 26 on postcard

Potentiometer

Universal (guarded) potentiometers are described in a data sheet. It lists complete specifications of the instrument and gives typical applications in laboratories. A full page illustration of the potentiometer is shown as well as components such as slidewires, switches, binding posts, etc. A complete description of the circuit operation, including schematic diagrams, is included. The uses of auxiliary potentiometers are discussed. Accessories and ordering instructions are given. *Leeds & Northrup Co.*

For free copy circle No. 27 on postcard

Handling system

A new 20-page catalog on a storage and handling system contains many product illustrations and installation photographs. Detailed facts and figures on dimensions prices, etc. are listed. It provides templates to help users plan layouts. *Stackbin Corp.*

For free copy circle No. 28 on postcard

Truck couplers

Couplers used on power industrial trucks are discussed in new literature. It covers the pin type, which can be had in various dimensions and sizes according to specific requirements; the double height pin type which permits two coupler heights; the automatic coupler which can be adapted for hand or foot operation; the remote control pin type which permits hand or foot operation from the driver's seat; the "U" bolt type and the pin type with chain which may also be operated from the driver's seat. *Elwell-Parker Electric Co.*

For free copy circle No. 29 on postcard

Job-microhoning

Experimental, small lot and long run job-microhoning backed by 27 year's experience is presented in a four-page folder. It introduces and explains one firm's job-microhoning service. The method produces a clean-cut surface on both soft and extremely hard materials, while holding precision tolerances. *Micromatic Hone Corp.*

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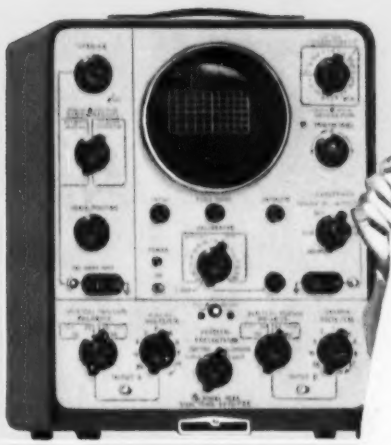
A woman's place is in the home?



HEWLETT-PACKARD'S NEW, MODEL 150 OSCILLOSCOPE

Not any more... and Hewlett-Packard Instruments project them into highly technical occupations!

But no matter who operates them, it is logical that Hewlett-Packard's ability to design their complex, electronic instruments would be reflected in their demand for efficient and economical assembly methods.

That's why, almost without exception, Hewlett-Packard depends on Sciaky resistance welding techniques and equipment to satisfy their rigid specifications for fastening—aluminum cases of all sizes and shapes . . . complex chassis assemblies . . . even precision variable condenser stators and rotor assemblies.

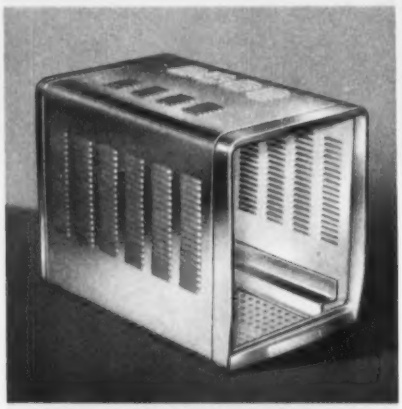
Putting the profits back into manufacturing is the Sciaky concept of design. So, whether or not *you* make instruments—assemble the metal pieceparts of *your* product to best advantage with Sciaky resistance welding techniques—like Hewlett-Packard does!

SCIAKY®

Largest Manufacturers of Resistance Welding Machines in the World

Maybe the details of Hewlett-Packard's operation on the next page will help you improve your own

OSCILLOSCOPE CHASSIS—resistance welding 12 piece parts of 14 and 12 ga. 52S aluminum; 80 spot welds per chassis; 40 chassis per day with two welders.



SIGNAL GENERATOR CABINET—resistance welding 8 piece parts, 14 ga. 52S aluminum and cast bezel; 55 welds per cabinet; 16 cabinets per hour with two welders.

VARIABLE CONDENSER—projection welding 6 piece parts to high accuracy in one stroke; 350 condensers per day with two jigs, one operating, one loading.

Sciaky Resistance Welding Techniques increase production 150%

Better product quality, easier assembly are additional benefits

For Hewlett-Packard Company, Palo Alto, California, leading electronic instrument manufacturer, Sciaky Resistance Welding Techniques have provided four basic cost cutting production advantages—

1. **Increased production—as much as 150%.**
2. **Elimination of fit-up problems of riveting.**
3. **Simplified quality control procedures.**
4. **Adaptability of equipment to pilot runs without costly tooling.**

So successful have Sciaky Resistance Welding Techniques been —even on jobs where other equipment failed—that Hewlett-Packard is now designing all new products for Sciaky Resistance Welding. And old products are being redesigned to take advantage of this economy, too.

Described at the right are a few of the jobs being done at Hewlett-Packard with Sciaky Resistance Welding Techniques *designed to put the profits back into manufacturing.* These and other jobs are described in greater detail in "Resistance Welding at Work," Vol. 5, No. 2. Write for your free copy today.

Largest Manufacturers of Resistance Welding Machines in the World

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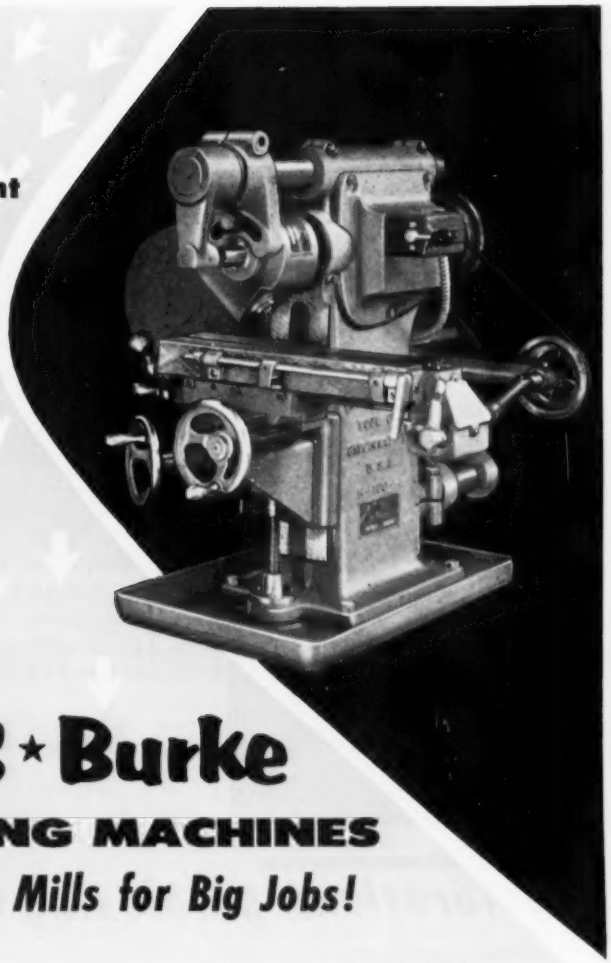
Sciaky Bros., Inc., 4928 W. 67th Street, Chicago 38, Illinois POrtsmouth 7-5600

Small parts bottlenecks strangling your milling department

?



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No. 1 U. S. MILLING MACHINE

The top-quality precision mill, economically priced! May be hand operated, or equipped with air-hydraulic feeds for high production applications.

This accurate and simple-to-operate mill brings small part production into balance, with low-cost operation that avoids wasted time and investment in big mills.

Excellent for keyways, quantity runs of small pieces, such as sectors, short racks, simple profiling, sawing, slotting, squaring, cut-off, short-run splining, even light slab milling.

BURKE BENCH MILLERS

Here's small part milling accuracy for either toolroom or production uses. Choose between 2 hand and 2 power feed models.

Rugged frame, hand scraped thruout, Timken bearings . . . in a time-tested design that provides accurate milling, drilling, sawing, boring, facing and slotting of small parts.

Wide range of speeds handles any material. Dependable performance and ease of set-up lower operational costs on all types of small parts. Vertical Milling Attachment and complete range of other accessories available.

Write for complete specifications and prices

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Certified ANALYSIS can be given on any Ulbrich material

Handling: Atom Vessel

Installing any 150-ton item poses problems . . . Handling this with a watchmaker's tolerance is increasingly difficult . . . Testing the crane, rigging takes nine days.

Any time a construction firm installs a piece of equipment weighing more than 150-tons, it faces special problems. However, when the item must be handled with a watchmaker's tolerance, the job becomes increasingly complicated.

That was the challenge facing Dravo Corp. and Westinghouse engineers when they began installation of the atomic reactor vessel at the AEC-Duquesne Light Company Shippingport, (Pa.) atomic power station.

Shifting Takes Nine Hours

The 153-ton steel vessel was moved by an overhead crane from a flat car to a point directly over the opening of the reactor sphere and then lowered 35-ft into the sphere. The move took more than an hour; another nine hours were required for the shifting of the vessel from the crane to the suspension rigging. Almost two weeks before, engineers began making sure that the crane, other handling equipment components and the suspension rigging would support the vessel.

Using a test weight frame which they had fabricated, workmen spent nine days testing both crane and rigging with successively heavier

WANT MORE DATA?

You may secure additional information on any item briefed in this section by using the reply card on page 97. Just indicate the page on which it appears. Be sure to note exactly the information wanted.

Pre-tested overhead crane hoists the vessel from a flatcar.

Perforations perplexing you?

If you have a design problem that's got you down maybe Hendrick can be of help. Sometimes the easiest and quickest way to enhance a product's beauty is to include a pleasing pattern of perforations in its design. Hendrick perforated metal not only helps increase a product's overall attractiveness, but also adds to its saleability as well. And whatever material you're using . . . whether it's metal, masonite, rubber, plastic, hard or insulated board for decorative display or fabricating purposes you can draw on Hendrick's long experience and perforating facilities to fill the bill. Write for details.

...better call HENDRICK

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MANUFACTURING COMPANY

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Perforated Metal • Perforated Metal Screens • Wedge-Slot and Wedge Wire Architectural Grilles • Mitco Open Steel Flooring • Shur-Site Treds • Armorgrids

loads of 6½-ton steel ingots. The frame was loaded finally with 23 ingots. This simulated both the weight of the reactor vessel and the steel beam harness which was bolted to it so that the crane hook could be attached.

Since the suspension system also must bear this weight, plus the weight of the insulation layer and the inner and outer neutron shield tank walls, it was tested with 37 ingots. This totals 245-tons, including the frame's weight.

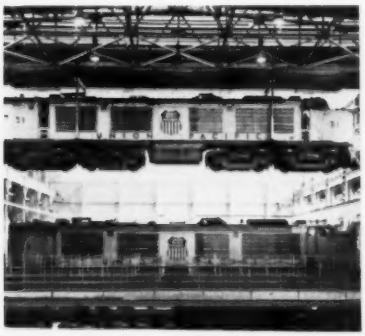
Cables Hold The Vessel

Much of the 15-ton suspension rigging was manufactured at Dravo's Neville Island plant. The vessel actually is suspended from four sets of 2-in. thick steel cables. Each is capable of lifting 90-tons. The cables are attached to four giant eye-bolts, each 20-ft long and 4½-in. in diameter.

Joining:

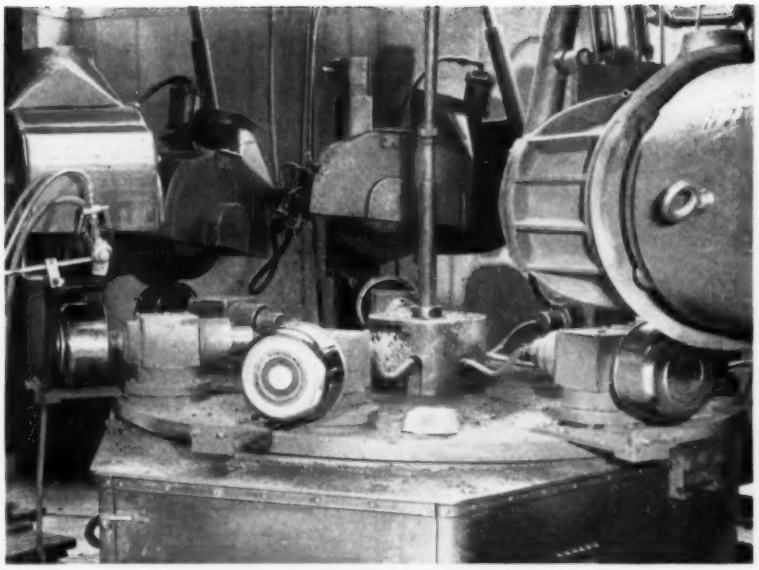
Soldering job used to take 12 hours; now, only one.

Keeping giant diesel locomotives rolling is the function of a new commutator soldering machine. It solves maintenance problems of railroad repair shops persistently faced with costly and time consuming commutator repair problems.



The unit solders large diameter 6-ft long locomotive armatures.

The equipment, developed by Induction Heating Corp., Brooklyn, N. Y., handles large diameter locomotive armatures measuring from 4 to 6 ft long in the shops



DORMEYER Corporation finds...

Automatic finishing with 3M "PG" Wheels cuts costs 66%

Dormeyer Corporation, nationally known Chicago appliance manufacturer, was using sisal buffs on a six-station rotary automatic machine to finish their stainless steel mixing bowls. This method was expensive, with daily production averaging 2200 finished bowls, and many rejects.

A 3M Engineer suggested that this company install 3M "PG" Wheels (made of hundreds of pieces of die-cut coated abrasives) on the first three stations of the automatic machine; a Grit #280 "PG" Wheel at the first station, a Grit #320 at the second and a Grit #400 at the third, all lubricated with liquid tripoli. The last three stations remained color buffs.

Results: production increased nearly 25% to 2900 finished units per day, and rejects were eliminated! Each "PG" Wheel finishes an average of 50,000 bowls—compared to 1700 for each sisal buff—thus cutting down-time to a minimum. Over-all finishing costs were cut 66%.

PERFECTLY ADAPTED TO AUTOMATIC FINISHING

If you now have or are planning to install an automatic finishing operation, it will pay you to get full facts on the 3M "PG" Wheel. Call your 3M Representative today, or send the coupon below.

3M ABRASIVES

WANT MORE INFORMATION?

Minnesota Mining and Manufacturing Co.
Dept. DE-17, St. Paul 6, Minnesota

☐ Send me full details about 3M "PG" Wheels
☐ Please have a 3M Representative call

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COMPANY.....

ADDRESS.....

CITY..... ZONE... STATE.....

Made in U.S.A. by MINNESOTA MINING AND MFG. CO. General Offices: St. Paul 6, Minn. In Canada: P.O. Box 757, London, Ontario. Export Sales Office: 99 Park Avenue, New York City.

PRODUCT OF 3M COMPANY RESEARCH

of the Union Pacific Railway. It solders and unsolders commutators in one hour flat. Railroad shops often take as long as 12-14 hours to perform this soldering operation.

Includes Generator

The commutator soldering machine, complete, includes a high frequency generator, turning stand for armatures with adjustable centers and adjustable work coils. A variable speed motor is furnished. This can be elevated to accommodate various diameter armatures. The technique of soldering large commutators consists of progressively heating a small portion of the commutator to the soldering temperature, as it passes under the high frequency heating coil.

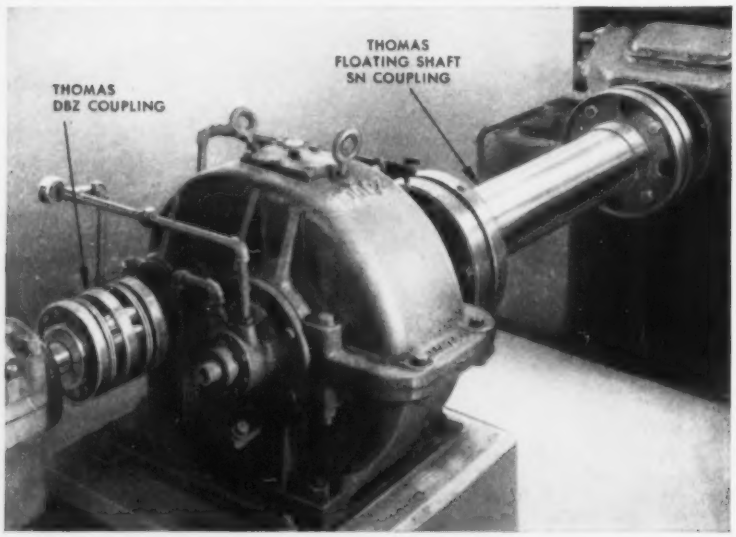
Solder paste, consisting of a powdered high temperature solder dispersed in a neutral rosin flux, is applied to the commutator risers. The armature is then supported horizontally on a power driven revolving table with the commutator projecting into the induction heating coil. The commutator is rotated and heated.

Serves As Precaution

As the commutator risers reach soldering temperature, the commutator slots will take solder. The armature, after making one revolution, is immediately removed and supported on the commutator end in a vertical position until cooled. This procedure serves as a precaution to preclude any solder from lodging behind the commutator risers. It, in turn, eliminates the possibility of solder shorts.

THOMAS FLEXIBLE COUPLINGS

Give You Freedom From Coupling Maintenance



NO LUBRICATION NO MAINTENANCE NO WEARING PARTS

Future maintenance costs and shutdowns are eliminated when you install Thomas Flexible Couplings. These all-metal couplings are open for inspection while running.

They will protect your equipment and extend the life of your machines.

Properly installed and operated within rated conditions, Thomas Couplings should last a lifetime.

Under Load and Misalignment only Thomas Flexible Couplings offer all these advantages:

1 Freedom from Backlash Torsional Rigidity
2 Free End Float
3 Smooth Continuous Drive with Constant Rotational Velocity
4 Visual Inspection While in Operation
5 Original Balance for Life
6 No Lubrication
7 No Wearing Parts
8 No Maintenance

Write for Engineering Catalog 51A

THOMAS FLEXIBLE COUPLING COMPANY
WARREN, PENNSYLVANIA, U.S.A.

Forming:

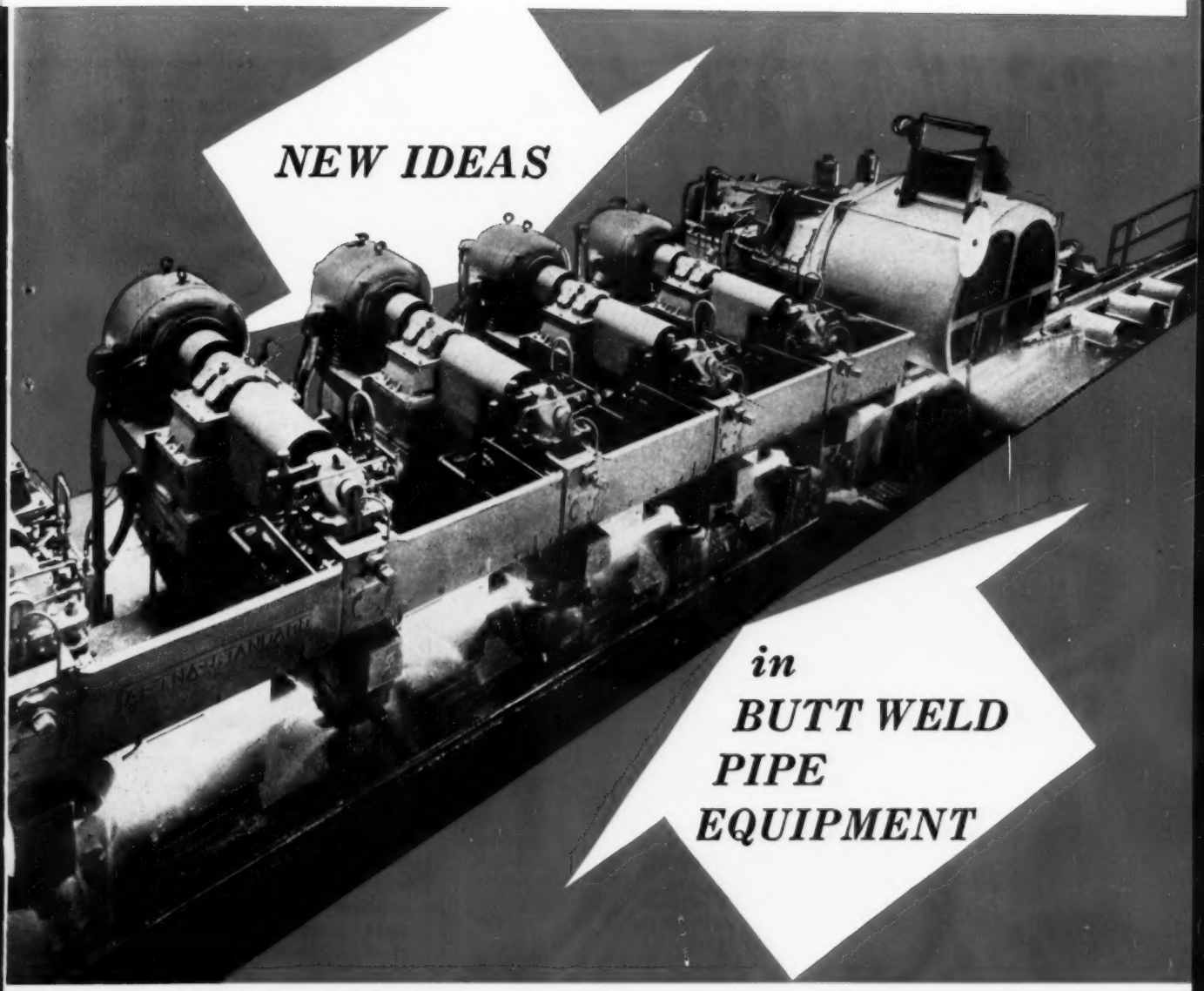
Hydraulic press brake forms pipe.

Forming pipe and well-casing with a hydraulic press brake is reported from Alaska Copper Co., Seattle, Washington. Uniform tonnage throughout a long stroke of up to 54-in. makes pipe forming on the relatively inexpensive machine possible.

Brake handles all performing, U-ing and closing operations.

With both the open height and the closed height adjustable, one brake handles all performing, "U"-ing and closing operations. Pipe is made out of steel plate of thicknesses ranging from 1/16 to 1½-in.

The versatile tool is also used in deep drawing, punching, bending,



UNCOILER-LEVELLER . . . Equipment includes automatic handling, weighing, storage, and uncoiling of coiled skelp ahead of flash welder. One man operation. Improved leveller has skelp deflector roll, adjustable independent of leveller roll bank.

ROTARY FLYING HOT SAW . . . Saw adjustments can be made to select any cutting length without reducing delivery speed from mill. Saw adjustment permits cutting single pipe lengths from 18 feet to 60 feet.

AUTOMATIC PIPE SELECTOR releases pipe at predetermined intervals. Controls gap between consecutive lengths of pipe. Eliminates overlapping of pipes as they enter Straightener. Eliminates need for operator to regulate continuous flow of pipe.

TRAVELING CRADLES facilitate removal of crane lifts of pipe from the line of production to maintain full mill efficiency.

POSITIVE TRANSFER of pipe from Screw Type Kickoff, following Sizing Mill, to Screw Type Cooling Bed.

AETNA • STANDARD

THE AETNA-STANDARD ENGINEERING COMPANY

GENERAL OFFICES: PITTSBURGH, PA. **PLANTS: ELLWOOD CITY, PA., WARREN, OHIO**

CONTINUOUS GALVANIZING LINES • CONTINUOUS ELECTROLYTIC TINNING LINES • SIDE TRIMMING AND SHEAR LINES AND OTHER FINISHING EQUIPMENT • CONTINUOUS BUTT WELD PIPE MILLS • SEAMLESS TUBE MILLS • DRAWBENCHES AND OTHER COLD DRAW EQUIPMENT • ROLLS AND CASTINGS • EXTRUDERS, MILLS, PRESSES FOR RUBBER AND PLASTIC

Get All the Facts about...

New 40 page Bulletin 54 just released contains detailed information on the complete line of Tinius Olsen Electmatic Testing Machines, which provide:

- **Positive testing speeds—even under load.**
- **Minimum of 100 to 1 ratio of testing ranges.**
- **Unlimited stroke.**
- **Widest selection of instrumentation available.**

These are just a few of the outstanding features of Tinius Olsen Electmatic Testing Machines described in this bulletin.

Write today for a copy of Bulletin 54.

TINIUS OLSEN
TESTING MACHINE COMPANY
2120 EASTON ROAD • WILLOW GROVE, PA.
Testing and Balancing Machines

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straightening, extruding, stamping and shearing operations of Alaska Copper in their custom fabrication work.

The machine is manufactured by Pacific Industrial Manufacturing Co., Oakland, Calif.

Steelmaking:

Operators coax iron from busy furnaces.

A blend of skill and science is coaxing more iron from existing blast furnaces than ever before, according to blast furnace experts who recently presented a technical paper at an American Iron and Steel Institute meeting.

Good Raw Materials Help

Given proper conditions, the use of sized iron ore and coke boosted the production of one group of furnaces by nearly 13-pct. In another case, output rose 15-pct when the furnace gas pressure was increased. The proper use of sinter was responsible for a 20-pct gain in the iron production of another furnace. Introducing steam or oxygen into the blast, and preheating the blast of air are other techniques more than usual to make America's blast furnaces "perform better than they knew how."

Progress Hard Won

Progress of this nature is hard-won because giant structures and huge volumes of materials are involved at great cost. For example, the world's largest blast furnace, completed last year in the mid-West, towers 252-ft above the yard level. Every day it uses 3200-ton of iron ore, 1300-ton of coke, 550-ton of limestone, 55,000-ton of water for cooling and 5000-ton of air for blast, according to the owners. Much planning is required before operating changes are risked on facilities approaching the size of this one, which can produce molten iron at a rate of well over one ton per minute.

After much scientific knowledge is applied to increasing iron production from existing furnaces,

a high degree of operating skill is required. This is true because all furnaces do not react in the same manner to a given procedure. As an example, the same proportion of sinter that caused a 20-pct production gain in one furnace gave only a 7-pct increase in another. The reasons involve variances in the other raw materials used and differences in some aspects of the furnaces.

The ordered race to make more iron is being won by imaginative and sometimes spectacular methods. This year, one company replaced a relatively small blast furnace with one twice the size while operating the smaller one during a large part of the construction period. The new stack was built on a trestle nearby. Then it was rolled to the site of the old furnace, which was demolished at the last moment.

New Books:

"Life on Two Horizons," by John Sonnenfeld is a perfectly delightful biography of an Austrian who became a successful American foundryman. Mr. Sonnenfeld's account of his youth in Bosnia, then part of the Austro-Hungarian Empire, reads a little like the humor of Ludwig Bemelmans; the latter portion reminds one of Dos Passos in his rollicking sidelights on America's industrial development. There are scenes in old Vienna as the author attended the Technical College. Attended is hardly the word —it was a rough grind, but he lived every moment of it. Later he takes the reader through some of the trials and tribulations of a man who knew how to make steel but who couldn't always convince management of it. The depression once demoted him to a combination night watchman and refrigerator salesman. But he came back, with general business. Later he revisited the scenes of his youth. He concludes, "in forty years I have never for a moment regretted coming to America. How could I?" 154 pp. $2.75. Vantage Press, 120 West 31 St., New York 1.

"Manufacturing Methods and Processes," is a single volume summary on new developments in manufacturing methods, their end products and economics. It provides a broad, general background on the subject. This should prove an excellent text and reference book for technical, vocational or college courses. Although it covers old standbys like sand casting, stamping and machining, special attention is given to new developments (i.e.: powder metallurgy, investment casting, plastics, ultrasonic machining, dielectric heating, electronic printed circuits and automation.) 562 pp. Over 450 illustrations. $12.50 per copy. Chilton Co., Chestnut and 56th Sts., Philadelphia 39.

"Nickel Handbook & Commercial Outlook for 1957," includes a detailed description of supply-demand consumption, prices, primary nickel

Now! Ajax SALT BATH FURNACES with REMOVABLE SUBMERGED ELECTRODES

What used to be a costly, time-consuming job now takes only an hour or two at the most. Labor cost is next to nothing . . . and there is little or no "down time" for the heat treating equipment because Ajax Removable Submerged Electrodes can now be changed without tearing down either the furnace wall or the pot.

Electrodes enter from over the top and slant into the salt bath. *There are no openings below the salt line.* A ceramic tile over each pair of electrodes seals off all air and eliminates corrosion at the salt line. *Thus, all the inherent advantages of submerged design are assured.*

To expose the electrodes for rapid removal, it is only necessary to lift the tile. The entire job can be handled by unskilled labor. Actual electrode changing time is less than an hour per pair.

Write for Bulletin 810 giving full details.

REPLACE AJAX REMOVABLE SUBMERGED ELECTRODES

. . . at absolute minimum labor cost
. . . without costly shutdowns
. . . without tearing down either furnace or pot

NOTE TO AJAX USERS! For as little as one fourth the cost of a new furnace, old Ajax Submerged Electrode Furnaces can be changed to this new removable electrode design.

AJAX ELECTRIC COMPANY
904 Frankford Ave., Philadelphia 23, Pa.
Associates: Ajax Eletric Furnace Corp.: Ajax Engineering Corp.: Ajax Electrothermic Corp.

producers, nickel plating supply houses, jobbers and secondary nickel suppliers. Also included is a description and reproduction of government priorities and export regulations. 70 pp. $10 per copy. Herman B. Director Associates, 1511 K St., N.W., Washington 5, D. C.

"The Development of Markets for New Materials," by E. Raymond Corey, is basically a study of building new end-product markets for aluminum, fibrous glass and various plastics. It deals with one aspect of a broad field—the marketing aspect of the introduction and early growth period of relatively new fabricated materials. 265 pp. $4 per copy. Div. of Research, Harvard Business School, Soldiers Field, Boston 63, Mass.

"Factory Electrification," by F. T. Bartho & C. H. Pike, provides a general guide to the selection and use of electrical equipment for

NON-FLUID OIL
TRADE MARK REGISTERED

ARE YOU WASTING COSTLY POWER?

Unless every bearing, gear and moving metal surface of your machines and motors is getting correct lubrication, you are losing valuable power that is being converted into destructive heat! Also you are taking a chance that your machinery will break down and wear out quicker.

Correct lubrication means NON-FUID OIL—the unique lubricant that is neither oil nor grease, but has all of the desirable qualities of both without their drawbacks. NON-FLUID OIL is a highly stable 100% lubricant that keeps lubricating effectively until entirely consumed—without undergoing the usual chemical and physical changes that result in gummy, friction-producing residues.

Don't take our word for it when we say that NON-FLUID OIL far surpasses other industrial lubricants and outlasts them 3 to 5 times. Send for instructive bulletin and free testing sample to try for yourself.

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1886 60 YEARS 1946 SIXTY YEARS OF LUBRICATION SERVICE TO INDUSTRY

NON-FLUID OIL is not the name of a general class of lubricants, but is a specific product of our manufacture.

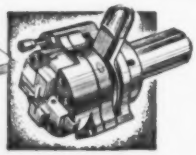
Fish Ride a Bus in Hells Canyon

One of the liveliest problems encountered by the Idaho Power Company in taming the mighty Snake River in North America's deepest gorge was that of migratory fish. During the construction of Brownlee, Hell's Canyon and Oxbow Dams, channels normally used by the migrating fish will be closed.

Gate City Steel of Boise was assigned the job of designing and building transport tanks, equipped with aereating, circulating and cooling equipment, to move the migratory fish around construction sites. Since October of 1956, two of these truck mounted "Fish Busses," designed and fabricated at Gate City Steel, have been giving fish free rides around construction at Brownlee Dam. For details about how our top engineering, design and fabrication facilities can help you on your next job, write:

GATE CITY STEEL
Box 1487 Boise, Idaho

H&C Insert Chaser DIE HEADS



famous for accuracy and straightness of threads, low chaser costs, less downtime, more pieces per day.

THE EASTERN MACHINE SCREW CORP., 21-41 Barclay Street, New Haven, Conn.
Pacific Coast Representative: A. C. Behringer, Inc., 234 N. San Pedro St., Los Angeles, California. Canada: F. F. Barber Machinery Co., Toronto, Canada

zinc
WIRE—STRIP, COILED FOR ELECTRIC FUSE ELEMENTS
EYELETS ALSO BRASS OR STEEL
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MULTIPLE SPINDLE
CHUCKING MACHINES
Four, Five, Six, Eight Spindles • Work and Tool Rotating Type
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"I SAW IT IN THE IRON AGE"
is a common phrase in the metalworking industry. Let the industry say it about your product.

factories, treating the subject in an essentially practical manner. It is easily intelligible to all who are familiar with the elements of the theory and practice of electrical engineering. It should be of greatest value to executive engineers and those working with maintenance and installation. 398 pp. $12 per copy. Philosophical Library, Inc., 15 E. 40th St., New York 16.

"Commercial Waxes," edited by H. Bennett, is a completely revised and enlarged second edition. It contains information on waxes for foil coating, electroplating, metal treatment, etching, etc. However, this data is buried in text concerning virtually every conceivable wax, production and applications. 688 pp. Chemical Publishing Co., Inc., 212 Fifth Ave., New York City.

"Engineering Inspection Manual," by Henry A. Roy, is intended to be an aid to inspectors engaged in machine tool, aircraft, and other mechanical inspection. It is based on the author's experience as an inspector. Methods are presented clearly and simply. 160 pp. $5.75 per copy. Chemical Publishing Co., 212 Fifth Ave., New York City.

"Industrial Water Resources of Canada," is one of a series on the chemical quality of surface and municipal water supplies available for industrial use. 154 pp. Mines Branch, Industrial Minerals Div., Dept. of Mines & Technical Surveys, Ottawa, Canada.

"Metallizing Bibliography," is exactly what the title implies. 35 pp. $1.50 per copy. American Welding Society, 33 W. 39th St., New York 18.

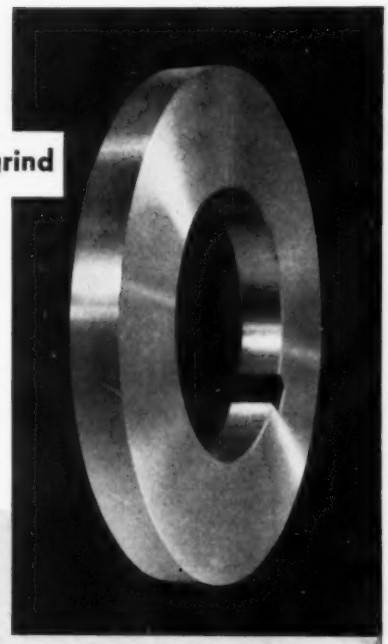
"A Primer to the Automatic Office," supplies its own definition of "automation" and traces the evolution of the word. It tells how automation can be applied to all types and sizes of offices. The authors are William Eustis, Gilbert Dresser, Franklin Wyman, Jr., and William Alden. 103 pp. $7.50 per copy. Automation Management, Inc., Westboro, Mass.

COWLES

TRIMMING KNIVES

produce more tonnage per grind

Cowles knives stay on the job longer. They keep mills in continuous production without downtime for knife changes. Manufactured from individually hammered forgings, and heat treated to assure maximum durability, they meet industry's most exacting requirements. Complete range of sizes. **Prompt delivery.** Widely used by all principal producers and processors. Let us quote on your requirements!



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Specializing in the Manufacture of

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This is under no circumstances to be construed as an offering of these securities for sale, or as an offer to buy, or as a solicitation of an offer to buy, any of such securities. The offer is made only by means of the Prospectus.

1,088,179 Shares

Armco Steel Corporation

Common Stock

($10 par value)

Rights, evidenced by Subscription Warrants, to subscribe for these shares have been issued by the Corporation to holders of its Common Stock, which Rights expire January 24, 1957, as more fully set forth in the Prospectus.

Subscription Price $56 per Share

During and after the subscription period the several Underwriters may offer shares of Common Stock, all as more fully set forth in the Prospectus.

Copies of the Prospectus may be obtained from the undersigned only in those States in which the undersigned may legally offer these securities in compliance with the securities laws of the respective States.

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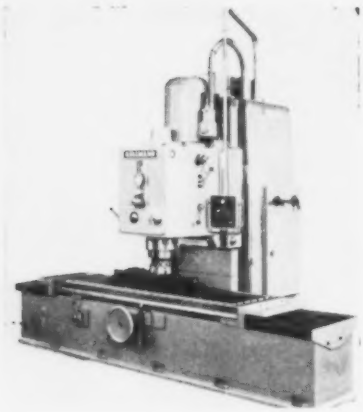
Merrill Lynch, Pierce, Fenner & Beane — Stone & Webster Securities Corporation

White, Weld & Co. — Dean Witter & Co.

January 11, 1957

NEW EQUIPMENT

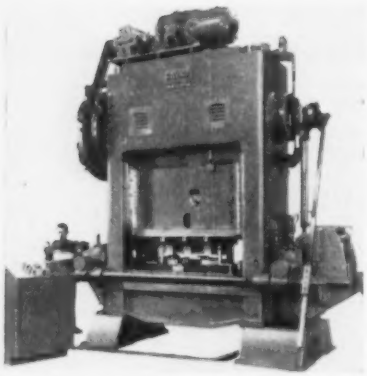
New and improved production ideas, equipment, services and methods described here offer production economies... for more data use the free postcard on page 97 or 98.



Machine meets qualifications for milling superalloys

Machining of superalloys requires extra accuracy and surface quality as well as extra efficiency in machine tools. A newly designed milling machine meets these superalloy machining requirements. Built in several models, the miller can also handle the precise milling of conventional materials. Rigid construction of the bed is an important feature of the unit. The table is well supported on the miller's wide bed. This is done in order to eliminate tilting or sagging in its extreme positions. It provides accuracy along the entire traverse. The machine's drive is through the main leadscrew and a specially designed nut. Thus, backlash is eliminated. The table can be adjusted mechanically and by hand. This can be done in both directions of movement with the scale dial. It works conventional materials efficiently, its maker says. *Albert Klingelhofer Machine Tool Corp.*

For more data circle No. 31 on postcard, p. 97



Non-vibrate press works at 250 strokes per minute

A 200-ton Flexopress operates with speeds up to 250-strokes per minute. During check-out runs, the press was fitted with an 8-station progressive die and operated at 150-strokes per minute with a 4-in. stroke. During this run a coin remained balanced on edge on the bolster, attesting to lack of vibration. The slide, fitted with four pre-loaded ball bearing raceways, contributes to the high vertical accuracy. The ram bottom is parallel to bed within 0.0005-in. Equipped with air friction type clutch and scrap cutter, the press has double feed rolls mounted integrally for accurate stock feed. It has an all steel frame, welded and keyed with four tie-rods. Powered by a 25-hp variable speed motor, it features console control. The press is built to high machine tool standards, its maker says. *Precision Welder & Flexopress Corp.*

For more data circle No. 32 on postcard, p. 97

Forced air heater burns gas, light oil or heavy oil

Using a new fuel burning concept, this direct fired forced air space heater promises high air-heat volume with low fan horsepower requirements. The system comes in nine sizes, ranging from 250,000 to 2,000,000-Btu/hr output capacity. Heart of the new heater is an induced draft burner suited for gas, light oil, heavy oil, or combination gas/light oil firing. Instant fuel changeover, effected by a manually or thermostatically operated switch, is featured on combination fuel models. For firing heavy No. 5 fuel oil, the burner employs a dual preheating system. Fan motor requirements, based on 75°F, range as low as ½-hp and up to 7½-hp, depending on heater size. Air-heat ratios range from 11,000 to 16,000-cfm per 1,000,000-Btu/hr output. The heater has two basic components. The furnace section has the induced draft burner, stainless steel combustion chamber, secondary heat transfer tubes of aluminized steel and electronic flame failure protection. The circulating fan section contains low speed fans. *Dravco Corp.*

For more data circle No. 33 on postcard, p. 97

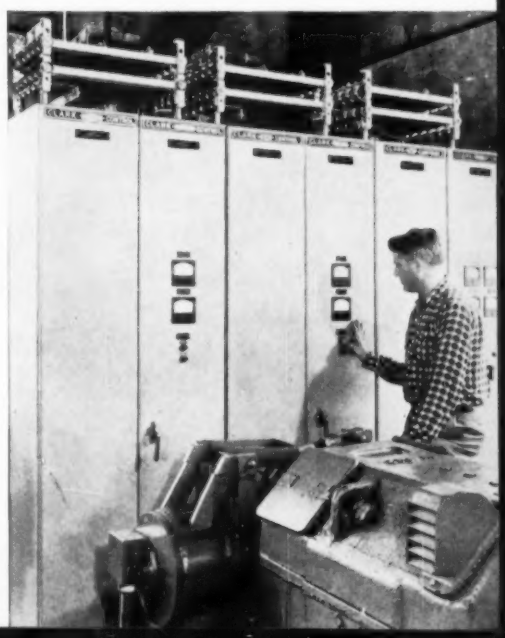
ONE MAN and CLARK CONTROL operate this giant unloader with capacity of 1100 tons per hr.

An average of 10,000 tons of coal per day is unloaded from river barges at the Ohio Valley Electric Corporation's Kyger Creek power plant, by two Heyl-Patterson rope-trolley unloaders. This plant and another like it at Clifty Creek are the largest privately-owned generating stations in the world—combined capacity 2,365,000 kw—supplying a total of 17 billion kilowatt hours per year for an Ohio atomic energy project.

Clark adjustable voltage control systems with magnetic amplifiers, team with Elliott rotating equipment in each unloader to provide maximum unloading rate, smooth acceleration and stopping, high efficiency, low maintenance and long rope life. One man controls the entire operation.

This is another example of greater operating efficiency through Clark-engineered Control. Let us help solve your control problems.

Clark control including magnetic amplifiers, located in motor room atop the tower, provides adjustable voltage control with current limit acceleration, deceleration and dynamic braking for the three drive motors. Note Clark edgewound resistors on top of the cabinet and Clark brake for the trolley motor in the foreground.



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Everything Under Control
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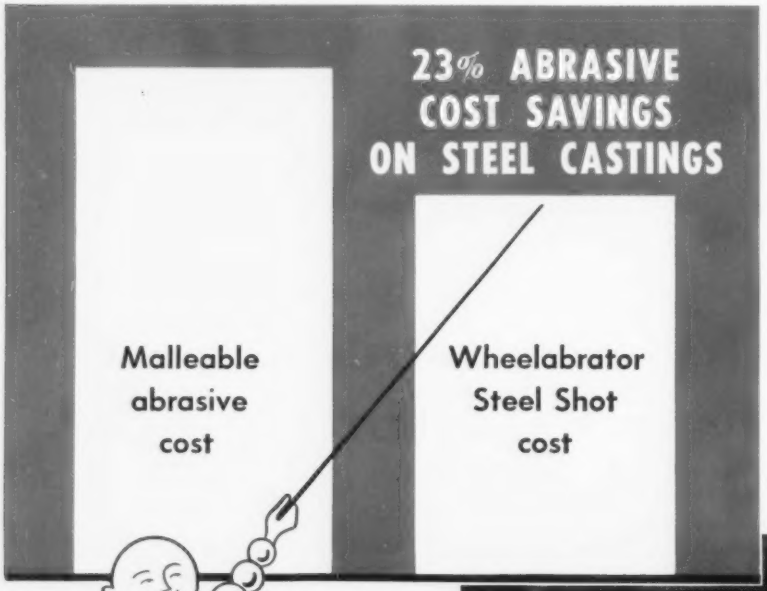
IN CANADA...CANADIAN CONTROLLERS, LIMITED • MAIN OFFICES AND PLANT, TORONTO

WHEELABRATOR® STEEL SHOT

Saves $8,000 a year for Crucible Steel Casting Co.

Wheelabrator Steel Shot has proved most economical in cleaning steel castings at Crucible Steel Castings Co.! Tests made in a 3-wheel Wheelabrator Monorail Cabinet showed these results: In 322 hours, the 3 wheels consumed over 19,000 lbs. of malleable abrasive for an abrasive cost averaging $1.578 per wheel hour for each wheel. In 202 hours, the machine used approximately 6,800 lbs. of Wheelabrator Steel Shot for an average abrasive cost of $1.215 per hour for each wheel. This means savings of $.363 per hour for each wheel. The Milwaukee steel foundry operates 10 wheels a total of 100 hours each day, so daily abrasive savings add up to approximately $36.30 — or about $8,000 annually. You, too, can save with Wheelabrator Steel Shot, the low-cost answer to cleaning problems.



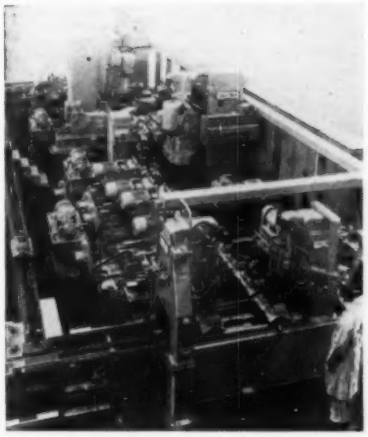
Test Machine

The findings reported above resulted from tests conducted in the Wheelabrator Monorail Cabinet shown below. This is only one of several airless blast cleaning machines operated by Crucible Steel Castings Co. to clean the wide variety of castings produced.

For additional information on Wheelabrator Steel Shot, send today for Bulletin No. 89-C

WHEELABRATOR
CORPORATION
510 S. Byrkit Street — Mishawaka, Indiana

Palletized transfer machine processes steel forgings



Forged steel steering knuckles are processed with this new 26-station segmented palletized transfer machine. The 6-ft long machine mills, hollow mills, drills, spot-faces, taps and reams steering knuckles at a net production rate of 146 pieces per hour. Two parts at a time are clamped in pallet - type fixtures. These are moved from station-to-station in the machining section with a transfer mechanism. The pallets are returned to the first machining operation by a motorized conveyor through a wash and blow-off operation. A unique automatic fixture clamping means speeds part clamping and unclamping operations. It also assures that the forgings are clamped in a position that will provide uniform stock removal from all machined faces. The parts are located in the fixtures by initially holding them down against V-locators with hydraulic cylinders. Then, air wrenches automatically clamp the part. *Snyder Tool & Engineering Co.*

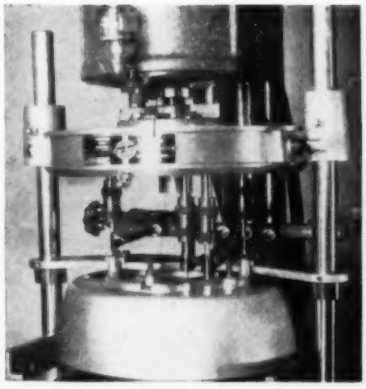
For more data circle No. 34 on postcard, p. 97

Mobile dry chemical engines fight Class "B" fires

Designed in answer to industries' requests for a high capacity, mobile extinguisher unit to combat Class "B" fires, this dry chemical engine comes in 75 and 150-lb classifications. The new models provide an effective means of killing big flammable-liquid blazes. Intended for use wherever oil, volatile liquids and paints and varnishes are used, the engines are compact, maneuverable, simple to operate and maintain. They are Underwriters' Laboratories and Factory Mutual Laboratories approved. The wheeled engines use pressurized nitrogen to expel smothering dry chemical powder through an adjustable nozzle. This can be set for long range or "fan" steam. The 150-lb model gives approved protection for 80-sq ft of flammable-liquid hazards such as open dip tanks, quench tanks, solvent vats, etc. *The Fyr-Fyter Co.*

For more data circle No. 35 on postcard, p. 97

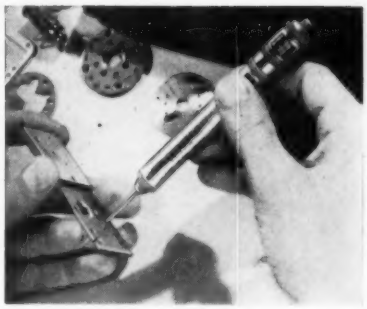
Tapping machine reverses; motor runs in one direction



Now an operator can slide a workpiece into a fixture on a tapping machine, press the start button, then watch the machine tap multiple holes to different depths, reverse and back out the taps. This, in itself, is not very unusual, except that the unit is driven by a motor which continuously runs in one direction. This fixture taps four 10-24 holes of different depths in a piecepart. The automatic lead screw unit is a self-contained, electrically controlled and actuated device. It provides fast single or multiple spindle tapping or threading. Use of Warner fractional horsepower forward and reverse clutches eliminates the need for a reversing motor and increases the tapping operation's speed. Clutch torque output can be varied by a rheostat control. This provides sensitivity for small taps and power for large taps. *Ettco Tool Co.*

For more data circle No. 36 on postcard, p. 97

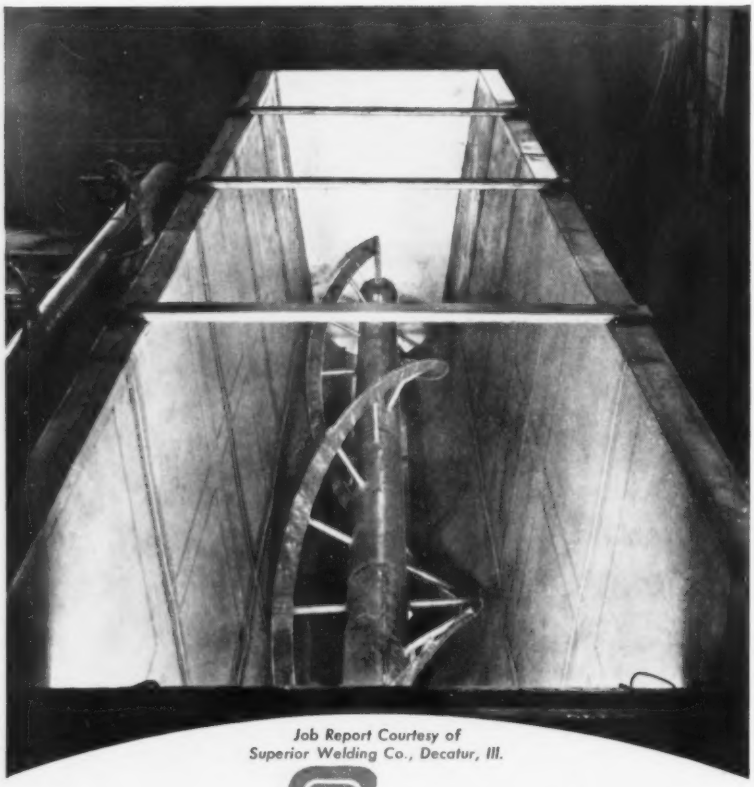
Adjustable hole gage rapidly checks small hole diameters



Rapid and accurate measurement of small hole diameters is possible with this precision tool. It checks hole diameters in five seconds or less. Accuracy and readability is 0.0005-in., the direct reading scale being marked in increments of 0.001-in. It has a 2½X manifying lens. A set of three gages cover hole diameters from 0.025 to 0.380-in. Each unit has a hole diameter range of 0.125-in. The gages have three basic functional parts: (1) a tapered retractable needle, (2) a precision clutch mechanism and (3) an easily-read magnified scale. They can replace 700 "go," "no-go" gages. *Allied Products Div., Hamilton Watch Co.*

For more data circle No. 37 on postcard, p. 97

How to get longer service from stainless welded equipment



Job Report Courtesy of
Superior Welding Co., Decatur, Ill.

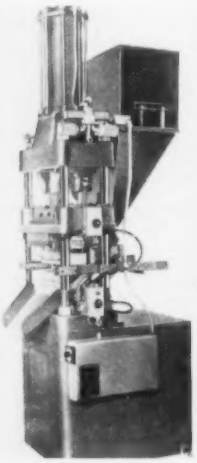
WELD WITH ARCOS

STAINLESS ELECTRODES

Processing certain foods in equipment such as this corn germ separator often releases acid by-products. These by-products, although weak, often corrode the equipment and contaminate the food unless the equipment is made of the "right" stainless. For welding the trough and agitator sections, two types of ARCOS Electrodes were used—Chromend KMo and Chromend 25/20 Mo respectively. These electrodes meet all the essentials: trouble-free welding, unbroken weld performance in service, and freedom from contamination. ARCOS CORPORATION, 1500 South 50th Street, Philadelphia 43, Pa.

Molding press

Working on reduced air line pressure, a new automatic compression molding press produces a full 50-tons on 100-psi. It features ruggedness and ability to withstand higher pressures. The pressure can be



upped to 120-psi, producing a full 60-tons. The press has a three-roller toggle system for increased stability. There has been no sacrifice of molding cycle speed over earlier models. *Automatic Molding Machine Co.*

For more data circle No. 38 on postcard, p. 97

Lead-plastic

A polyethylene lead filled thermoplastic compound produces a homogeneous casting suitable for use in radioactive shielding, or as a high density molding compound. It has a composition of 95-pct lead and 5-pct polyethylene by weight, and has a specific gravity of 7-grams per cc, approximately. The specific gravity of the final compound can be controlled by changing the ratio of lead and polyethylene. It melts at 220°F into a low viscosity liquid. At the melting temperature and at 300°F the compound can be poured into forms and used for simple castings. Its surface is smooth, and resistant to oxidation. Cast pieces can be remelted and cast again with no loss of materials due to oxidation. It is not soluble in most common solvents. *Telectro Industries Corp.*

For more data circle No. 39 on postcard, p. 97

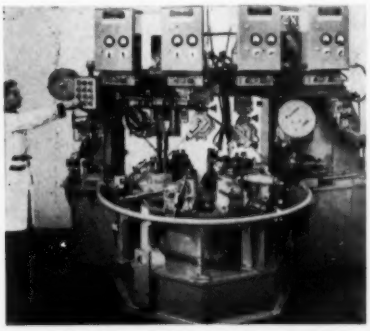
Gas torch

A portable torch burns manufactured, mixed, natural, propane or butane gas. It operates with compressed air at 40-psi or more pressure. It lights instantly without preheating. Its large size and rugged construction, fast heating without clogging or carbonizing, suit it for hard, steady, continuous or intermittent operation. It generates heat of 2700°F. and is unaffected by wind or weather. Flame size is adjustable from short minimum to long maximum flame. The torch is made in 5 sizes, the smallest burner producing a flame from 6 to 18-in. long, with maximum heat release of 325,000-Btu, burning 1000-Btu gas. The largest burner produces a flame from 10 to 48-in. long, with maximum heat release of 1,300,000-Btu per hour. *Hauck Mfg. Co.*

For more data circle No. 40 on postcard, p. 97

Index welder

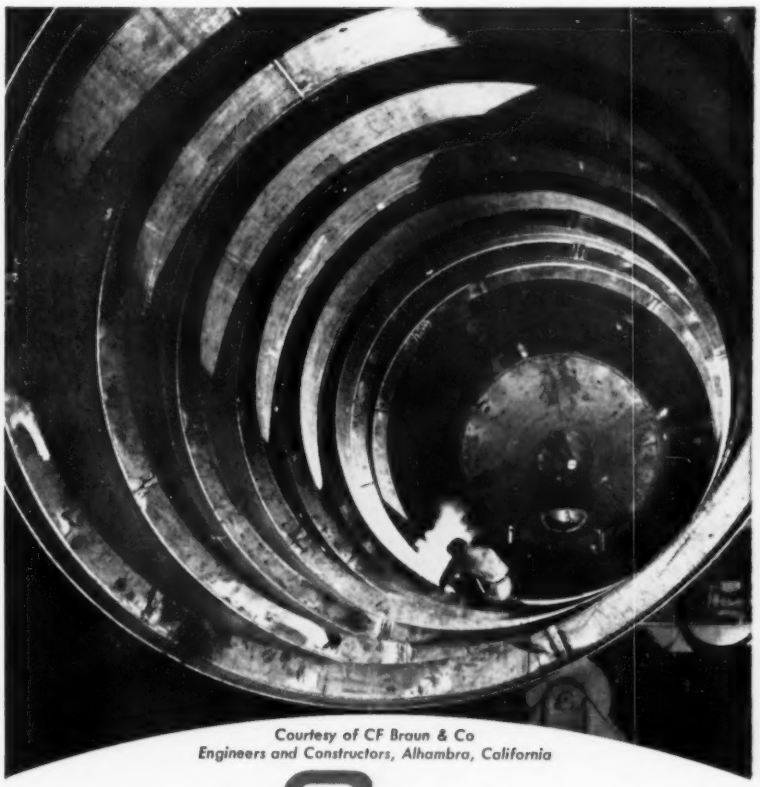
This automated eight-station horizontal rotary index arc-welder positions and welds together two-piece production parts. It features eight two-stage clamping fixtures. These are located at each table station. One fixture stage accurately positions and clamps a two-piece part



while tack welding operations are performed. The second stage fixture clamps and rotates the tack welded assembly, while continuous contour welds are made on both sides of the part. The index table is driven by a cam index mechanism. This decreases cycle time, provides smooth index movement and simplifies overall machine complexity. *Expert Welding Machine Co.*

For more data circle No. 41 on postcard, p. 97

More proof . . . how to get consistent results from submerged arc welding

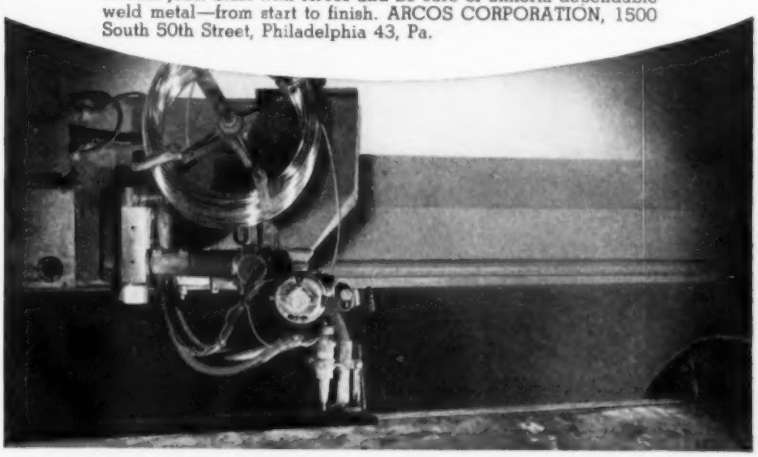


Courtesy of CF Braun & Co
Engineers and Constructors, Alhambra, California

WELD WITH ARCOS

STAINLESS COILED WIRE

Unfailing strength and resistance to corrosion at elevated temperatures are vital in the welds of this massive 14 ft. diameter, 30 ft. long catalyst pressure vessel. All seam welding of the 1¼ Chrome ½% Moly plate was submerged arc welded with Arcos Chromar *welding quality* wire. Arcos Chromar wire—like every Arcos filler metal product—can be used with confidence on the most critical jobs. Start with Arcos and be sure of uniform dependable weld metal—from start to finish. ARCOS CORPORATION, 1500 South 50th Street, Philadelphia 43, Pa.



Process observation, alloy additions, pouring, temperature and pressure readings, high frequency control, valve sequencing—all focus around one center of operation.

Small but versatile

a high-vacuum furnace for lab and pilot plant

CEC's 5 to 50 pound melting and casting furnace offers:

Three-way casting: Melts of 5, 12, 17, 30, or 50 pounds can be cast in single or multiple molds—or centrifugally.

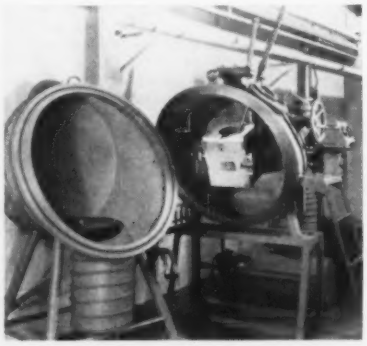
Ease of materials handling: All parts of the furnace interior are within arm's reach. The oblique angle flange connecting the chamber sections provides unusual vertical clearance for removing molds directly with a crane. A deep mold well provides 33" under the crucible lip for pouring bar-type ingots.

Complete controls: A manual bridge-breaker assembly is combined with a water-cooled, nonfogging sight tube for optical pyrometry. A sampling device and a thermocouple assembly are standard accessories. Interlocking of the pneumatic vacuum line valves makes for safe and proper cycling.

The mold well is water-cooled. Electric feedthroughs are provided for mold heating.

Ample pumping: A 2-stage diffusion-ejector pump brings the system swiftly to the low micron Hg pressure range, with plenty of reserve capacity for pressure surges from alloy additions, deoxidation, and pouring.

Write for illustrated bulletin No. 4-30 that lists complete specifications, accessories, and design features of this remarkably versatile furnace.



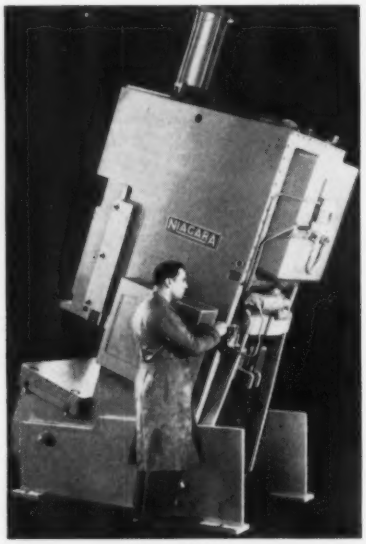
Open furnace shows crucible and coil assembly. Mold chamber has deep well and (optional) indexed table for multiple molds.

Consolidated Electrodynamics
Rochester Division, Rochester 3, N. Y.
formerly Consolidated Vacuum

NATIONWIDE COMPANY-OWNED SALES AND SERVICE OFFICES

Air motor device

A new, fast acting air motor inclining device is now available as optional equipment on a firm's O.B.I. presses (45 to 200-ton models). Easily operated with a hand valve, this labor-saving mechanism is especially suitable for presswork requiring frequent die



changes. An air motor drives the inclining nut through a high ratio worm gear to move the press frame up or down. With a shop air pressure of 80 or 85-psi, the press can be either inclined or brought upright over the full 30° range in approximately two minutes. The device is self locking to keep the press from dropping through air failure or line breakage. *Niagara Machine & Tool Works.*

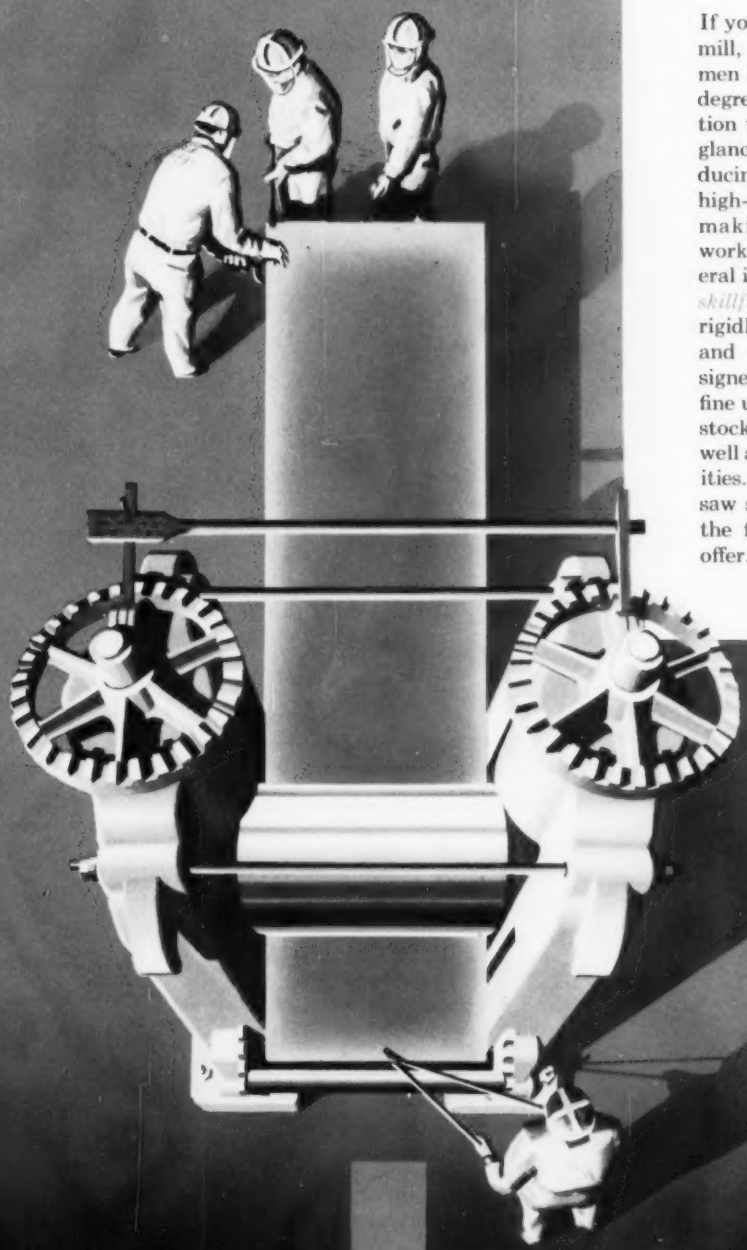
For more data circle No. 42 on postcard, p. 97

Immersion heaters

A translucent fused quartz immersion heater unit solves difficult problems that go with the heating of electroplating and pickling solutions. This U-shaped heating unit is mounted within the U-tube. The coil is firmly supported with special heat-conducting powder, and is hermetically sealed. A rugged, shock-absorbing, diamond type, plastisol-coated heater guard provides protection for the tube. *The Glo-Quartz Electric Heater Co.*

For more data circle No. 43 on postcard, p. 97

How Jessop skill makes better saw steel



If you could peer down into the Jessop mill, chances are you'd see groups of men hand-rolling sheets of steel with a degree of skill and careful concentration that might seem excessive at first glance. *Yet it isn't.* These men are producing a very special steel—top quality high-speed sheet which is used in the making of hack-saw blades, woodworking tools, metal-slitting saws, general industrial knives, and the like. But *skillful finish rolling isn't all.* Jessop rigidly controls its melting formulas and pours small ingots specially designed for cross rolling. This insures a fine uniform grain structure so that the stock blanks well, forms well, swages well and has superior edge holding qualities. Remember, when you order your saw steel from Jessop, you are buying the finest that Jessop experience can offer. *And that's mighty fine steel.*

JESSOP

STEEL COMPANY · WASHINGTON, PENNSYLVANIA

OFFICES IN PRINCIPAL CITIES

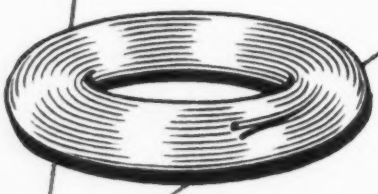
Jessop Steel of Canada Limited, Wallaceburg, Toronto

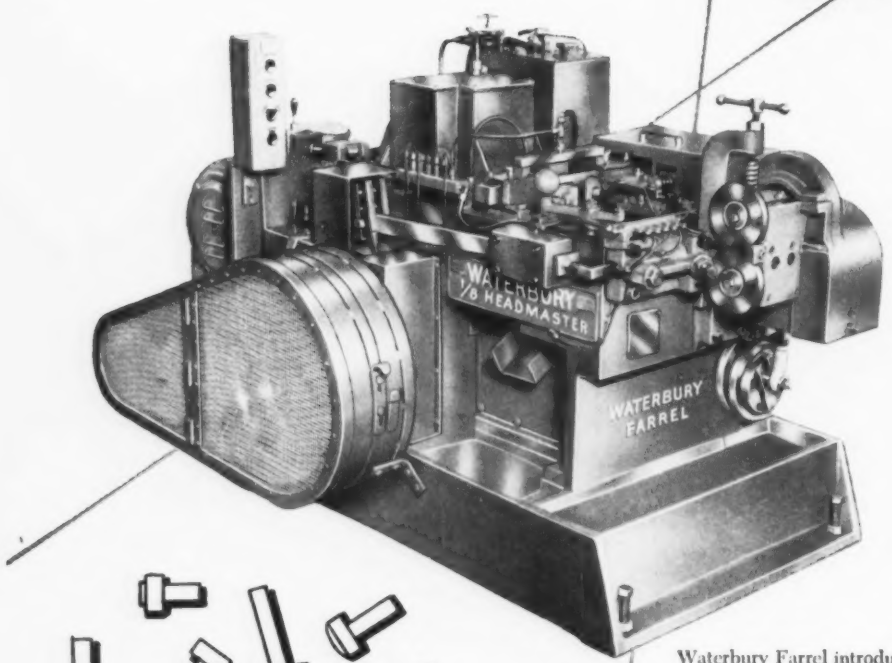
Jessop Steel International Corp., Chrysler Building, New York, New York

New! World's Fastest!

WATERBURY FARREL "HEADMASTER"

Heads 300 To 450 Screw Or Rivet Blanks Per Min.



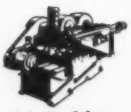


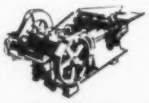
Waterbury Farrel introduces a revolutionary new concept in cold heading speeds... proven by actual production runs to be the world's fastest rates achieved by a solid die double stroke header.

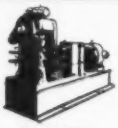
Operating at speeds from 300 to 450 blanks per minute, the machine will head rivets up to ⅝" x ⅞, machine screws up to #6 x ¾, and sheet metal screws up to #8 x ¾.

Write today for further information on Waterbury Farrel's "HEADMASTER."

WATERBURY FARREL FOUNDRY & MACHINE CO.
Waterbury, Conn., U.S.A.
Sales Offices:
Chicago • Cleveland • Millburn, N. J.


Bolt, Nut & Screw Machinery


Power Presses


Rolling Mill Machinery

Wire Mill Equipment

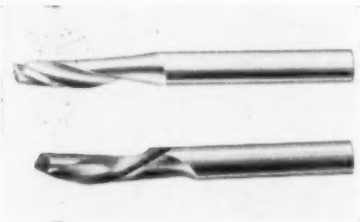
Sendzimir Mills and Other Special Machinery

WATERBURY FOUNDED 1851 FARREL

WF-33

Carbide routers

Solid carbide routers are precision ground to close tolerances for use on abrasive materials. A full range of standard sizes are available in all series such as single straight

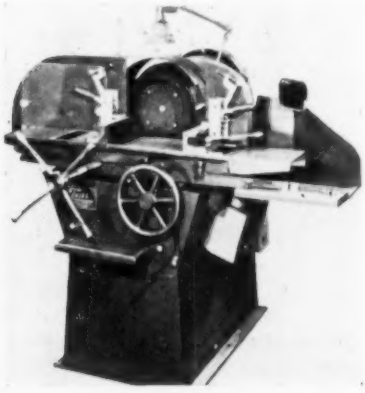


flute, single right hand spiral, single left hand spiral, two flute straight, two flute left hand spiral and three flute left hand spiral, all designed to do a specific job. *The Atrax Co.*

For more data circle No. 44 on postcard, p. 97

Facing machine

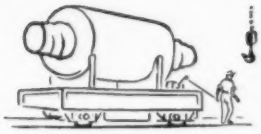
Flat and square surfaces on any work piece are produced with this machine. It has a 14-in. cup shaped grinding wheel mounted perpendicularly to the table. Work pieces need only one flat surface to be held to the table. Squaring and clamping blocks, sliding in table keyways, hold the work squarely rigid. Operating at 1400-rpm, the grinding wheel faces cold or hot rolled steel, tool steels, steel castings, and all non-ferrous alloys.



When greater stock removal is required, one of two progressive-cutting face mills may be substituted for the grinding wheel. *Eastown Tool & Engineering Co.*

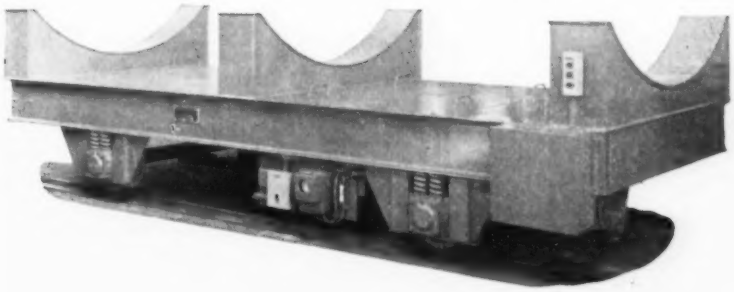
For more data circle No. 45 on postcard, p. 97

Links up your HANDLING NETWORK

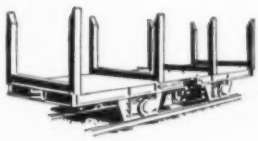


for added efficiency . . .

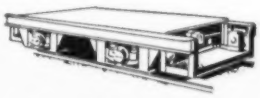
extra economy



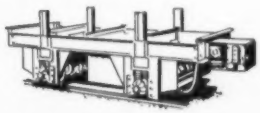
ATLAS WALK-ALONG
SAFETY-TYPE TRANSFERS



Special bed designs to cradle your load.



Single platform or double platform-operator rides.



Versatile power . . . diesel or gas electric, storage battery, or cable reel. Also remote control with no trailing cable.

If you're responsible for maintaining safe, low cost movement of heavy loads, (5 to 200 tons) and intermediate transfer of these loads during process or storage, Atlas can help you by engineering a transfer car to meet your exact load and power requirements.

Atlas engineering gives you every modern safety feature for personnel protection.

. . . choice of power and control including:

1. Single lever (walk-along) forward, reverse with safety stop when lever is released.
2. Storage battery power with built-in charger.

For Cost-Saving Details Request "Walk Along" Bulletin 1283

THE ATLAS CAR & MFG. CO.

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ENGINEERS & MANUFACTURERS SINCE 1896

Let KIRK and BLUM

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. . . on weldments and components

For 50 years, Kirk & Blum has served some of the nation's leading manufacturers . . . maintaining their confidence with substantial savings in time and cost. Whatever your fabrication, you can be sure Kirk & Blum will exercise the same care you demand of your own organization.

Kirk & Blum has complete facilities for fabrication of sheet metals, plate and structurals. Copper, aluminum, monel, stainless and other alloy fabrication is a K & B specialty.

Let us send you details on products we have fabricated—or, send prints for prompt quotation.
Kirk & Blum Mfg. Co.,
3200 Forrer Street.,
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KIRK & BLUM

Grinder feed

Where all four diameters are ground in one operation, a new unit automatically feeds universal joint spiders to a special Landis center-

less grinder. The parts feed from a 9-cu ft capacity hopper. They flow by an elevating conveyor to a delivery chute. Then, when properly oriented, they are delivered to the centerless grinder. *Feedall, Inc.*

For more data circle No. 46 on postcard, p. 97

Transmissions

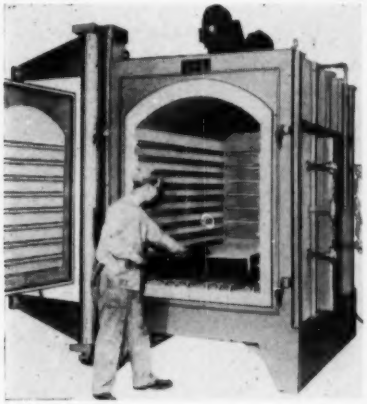
This variable speed transmission is adjustable over a complete range of 8:1 with settings adjusted either manually or automatically while unit is at stand-still or in motion. Transmission components run in oil and are completely en-

closed. Optional spur, bevel, or worm gear reductions are available and may be installed in any of four positions or planes. Only two sizes of socket wrenches are needed for dismantling and reassembly of complete transmission. *George E. Clentimack Co., Inc.*

For more data circle No. 47 on postcard, p. 97

Furnaces

This forced convection furnace is designed for many industrial heating operations, such as aluminum brazing, tempering, drawing, normalizing, hardening and many other operations with and without protective and special atmospheres. The sizes vary from 13 wide x 13 high x 25-in. deep to 40 wide x 36



high x 72-in. deep in 15 standard models. Furnaces are available with vertical lift and horizontal opening doors. Very close gradients are automatically maintained by means of powerful fans that circulate the atmosphere in the firing chamber. "True gradient" design insures this close gradient control over the entire heat range from 250° F to 1875° F. *L & L Mfg. Co.*

For more data circle No. 48 on postcard, p. 97

Tracer lathe

A new hydraulic multi-cycle tracer lathe machines irregular shapes at a rapid rate. Only one template, easily accessible on the front of the machine, is required for multi-cycle cuts. Two roughing cuts, a semi-finish and finish cut may be obtained all in one automatic cycle. An indexing tool turret permits the use of two cutting tools, one for roughing and one for finishing. Shoulder facing tools can be provided if desired for squaring operations, etc. The stylus, template and workpiece are in full view of the operator's normal position. The transmission type head is available in a 2, 4 or 8 speed type. *Sundstrand Machine Tool Co.*

For more data circle No. 49 on postcard, p. 97

ANY PLATER CAN AFFORD
THIS NEW ANSWER TO AN
OLD CHROME PLATING PROBLEM

UDYLITE
ZERO-MIST H.T.*

NOW YOU CAN COMPLETELY CONTROL MIST AND SPRAY FROM CHROMIUM PLATING BATHS

AT A VERY REASONABLE COST

LOW INSTALLATION COST: This new product of Udylite Research is so powerful that you need add only 1½ *pounds* to a 1000 *gallon* chromium plating solution to get perfect results.

LOW MAINTENANCE COST: The addition of as little as ¼ to ½ lb. in an 8-hour working day maintains mist and spray control. Its only loss is through dragout.

COMPLETELY STABLE: It's *completely stable;* it doesn't lose any of its strength during shut downs no matter how long they must be.

OPERATES AT HIGH TEMPERATURES: For the first time *the temperature of the bath has no effect on mist control.* Zero-Mist H.T.* works at any bath temperature, even boiling.

EASE OF CONTROL: It's *easy to control.* With the addition of Zero-Mist H.T.*, a thin foam blanket subsides when current is turned off, but reforms as the bath is again used. This foam blanket provides the simple visible check for efficient operation.

LOW COST • VISUAL CONTROL
*STABILITY • *HIGH TEMPERATURE OPERATION*

ZERO-MIST H.T. HAS THEM ALL

THE Udylite CORPORATION
DETROIT 11, MICHIGAN

WORLD'S LARGEST PLATING SUPPLIER

Photo courtesy Ross Heat Exchanger Division of American-Standard, Buffalo, N.Y.

"Because Ross Heat Exchanger Division has to be able to tell its customers how much cooling surface they're getting. That's a vital factor in a heat exchanger."

"I get it. That's why they use so many small tubes, instead of a few large ones. And Superior supplies the tubing?"

"Right. Stainless is the most popular, in ⅜ in. or ⅝ in. OD. But they order other analyses, too. The tubing has to have thin walls to perform the heat exchange function efficiently. It has to be strong to withstand the system pressure. And it's got to have smooth, clean inner and outer surfaces to minimize any pressure drop. Finally, it has to be tough, yet ductile enough to make installation easy."

Lend an ear, Mr. Design Engineer. They're talking about Superior tubing. The unit under discussion is made by Ross Heat Exchanger Division of American-Standard, one of the leading heat exchanger manufacturers. Superior tubing gives them the quality and dependability they like to build into their products.

This is only one of the many applications of Superior tubing in industry. We offer a wide range of tubing sizes in over 63 analyses, including stainless, carbon and alloy steels, nickel and nickel alloys, beryllium copper, titanium and zirconium.

Let us help you with *your* tubing problems. Our years of experience and our extensive facilities are at your service. For more technical information, write Superior Tube Company, 2004 Germantown Ave., Norristown, Pa., for your free copy of Bulletin No. 40.

Superior Tube

The big name in small tubing

NORRISTOWN, PA.

All analyses available in .010 in. to ¾ in. OD—certain analyses in light walls up to 2½ in. OD

West Coast: Pacific Tube Company, 5710 Smithway St., Los Angeles 22, Calif. • RAymond 3-1331

The Iron Age SUMMARY . . .

Steel market strong despite lag in automotive and appliances . . . Mills are operating at near-capacity . . . Strong steel-using industries include construction and oil.

Tail Wags Dog . . . The tail seems to be wagging the dog in the steel market this week. A few tentative soft spots are grabbing the attention. But the strength of the market runs deeper than the ups and downs of a few industries.

Steel demand from automotive and appliances admittedly is lagging. Auto sales generally have fallen behind expectations. And Detroit is gearing its steel buying accordingly.

But apparently the only effect of automotive cancellations and deferments so far is that other steel users are inheriting a windfall. Some mills are having little or no trouble finding a home for steel that Detroit has no use for.

Meanwhile, the strength of other major steel-using industries is keeping the steel operating rate close to capacity—a new capacity figure 5 million tons better than that of last year.

Where Strength Lies . . . These front-running industries include oil and gas, shipbuilding, construction, and freight car building. For some of them there's not enough steel available to fill their needs. Orders for oil country goods, linepipe, plate, and structurals continue to outpace ability to produce.

A check by THE IRON AGE shows that: (1) new plant and equipment orders will help support the steel market, (2) oil industry orders are up sharply for tubing, casing, and linepipe, (3) plans for defense buildup will take larger steel tonnages than formerly, (4) road building plans are up sharply for 1957.

Even without benefit of some appliance and automotive tonnage, the sheet market is strong for first quarter. Another thing: order cancellations are relatively rare. The reason: customers are keeping their foot in the door in case the market perks up.

Significantly, some gray market plate and structural tonnage is still being offered to warehouses and fabricators from Chicago brokers.

Scrap Skids . . . The situation in sheets varies from market-to-market. In some areas, mills have tonnages to offer for March—even for late February delivery. But other mills have begun booking cold rolled sheet orders for April, and say that tonnage coming in is satisfactory.

Steel scrap prices continue to fall. Prices of top steelmaking grades are off as much at $3 per ton in important consuming areas.

Steel Output, Operating Rates

Production	This Week	Last Week	Month Ago	Year Ago
(Net tons, 000 omitted)	2,510	2,484	2,388	2,297
Ingot Index				
(1947-1949=100)	156.2	154.6	148.7	148.5
Operating Rates				
Chicago	97.0	98.0*	101.0	100.5
Pittsburgh	103.0	99.0*	90.0	101.0
Philade'phia	103.0	104.0	104.0	100.0
Valley	98.0	98.0	84.0	98.0
West	99.0	100.0*	100.0	104.5
Buffalo	105.0	105.0	105.0	105.0
Cleveland	97.0	98.0*	104.0	97.0
Detroit	105.0	105.0	86.0	106.0
S. Ohio River	90.0	88.5*	98.0	95.0
South	98.0	100.0	92.0	97.0
Upper Ohio R.	103.0	103.0*	96.0	104.0
St. Louis	98.0	100.5	94.0	99.0
Northeast	31.0	31.0*	100.0	88.0
Aggregate	98.0	97.0	97.0	99.0

*Revised

Prices At A Glance

(cents per lb unless otherwise noted)

	This Week	Week Ago	Month Ago	Year Ago
Composite price				
Finished Steel, base	5.622	5.622	5.622	5.174
Pig Iron (Gross Ton)	$62.90	$62.90	$63.04	$59.09
Scrap, No. 1 hvy (gross ton)	$57.83	$59.17	$63.50	$50.83
Nonferrous				
Aluminum ingot	27.10	27.10	27.10	24.40
Copper, electrolytic	36.00	36.00	36.00	43.00
Lead, St. Louis	15.80	15.80	15.80	15.80
Magnesium ingot	36.00	36.00	36.00	33.25
Nickel, electrolytic	74.00	74.00	64.50	64.50
Tin, Straits, N. Y.	101.75	101.00	102.25	104.00
Zinc, E. St. Louis	13.50	13.50	13.50	13.50

*Revised

STEEL PRODUCT MARKETS

Is Dip In Ordering Coming?

Lack of automotive buying, some order deferments, and buyer caution are straws in the wind . . . Picture's not all bad, however . . . Second quarter could be decisive.

◆ SOME EVIDENCE points strongly to a coming drop in product buying. However, not all factors are on the negative side.

Current reason for gloom is the continued slackness in steel buying by the auto producers. Deferments of orders, particularly for hot and cold-rolled sheet, are plaguing the mills.

Apparently automotive buyers are keeping inventories low. What's more, they don't seem to be in any hurry to place second quarter orders. In general, there's a lot of hedging among steel consumers. Net result is that some mills even have tonnages available for first quarter delivery.

Customer inventories—except for products like plate, structurals, and pipe — are high. The warehouses feel any concerted sales campaign won't be productive until these inventories are worked off.

If automotive doesn't snap out of its doldrums in the spring, the buying drop could materialize. But there are encouraging factors in the picture.

Besides the expected sales spurt in the automotive field, there's the continued strength of the market for steel products in construction, roadbuilding, defense and other uses. There's also some indication that the steel buyer is keeping his foot in the ordering door, just in case.

What's more, some purchasers may buy heavily in the second quarter to beat the expected price increase around mid-year. This won't be a factor if the market is easy, however. Then they'll weigh the cost of building inventories more carefully against the hike in steel costs.

One thing is clear: what happens in the second quarter will pretty much determine what sort of a year this will be for steel products. By then most of the evidence will be in and analyzed.

PRICE NEWS . . . U. S. Steel Corp. and its operating divisions, Columbia-Geneva Steel Div. and Tennessee Coal and Iron Div., have revised the list of extras for carbon and low alloy-high strength structural shapes and plates. Jos. T. Ryerson & Son have announced new warehouse prices. (See page 133). New base prices for copper clad strip are reported by Superior Steel Corp. (p. 133).

Youngstown Sheet and Tube Co. has increased base prices on electric weld and seamless linepipe, grades A or B, in sizes 14 in. OD and larger. The company has also increased extras for all sizes in API 5-LX grades.

Revision of extras for hot-rolled strip were made by Wisconsin Steel Div., International Harvester Co. and by Atlantic Steel Co.

BARS . . . Spot tonnages for short delivery are available as a result of deferments or cancellations at **Cleveland.** It's a break for the smaller consumers in the area. Deliveries are just about current.

Carbon bars are described as "starting to ease" in **Detroit.** Cold-drawn and alloy bars are plentiful.

Despite some few hold orders at **Chicago** there are capacity operations for h-r bar during this quarter. Cold finishers are still busy.

At **Pittsburgh,** customers have shortened their lead time in ordering cold finished bars. Where they used to order three months ahead, they're now down to one-and-a-half months. Hot-rolled bars are still holding up well.

SHEET AND STRIP . . . Lack of demand, especially for c-r sheet, is reported by both mills and warehouses in the **Philadelphia** area. One producer admitted the mill could stand some current business for hot-cold- and galvanized-sheet.

Cold-rolled sheet and strip remains very soft at **Detroit.** Even hot-rolled, which was somewhat scarce, is beginning to ease.

Substantial tonnages of hot-and cold-rolled sheet are being offered in the **Cleveland** area for March delivery because of deferments by auto and appliance manufacturers. Lesser tonnages are even available for late February delivery.

Cold-rolled strip can be gotten in the **Boston** area on 2-5 week delivery. Same product may be had at **Cleveland** on 2-4 week delivery.

Chicago warehouses are easing off in their requests for h-r sheet. Cold-rolled sheet deliveries are current, with very little indication of high demand in the second quarter.

Mills in the **Pittsburgh** area are booking April orders for cold-rolled sheet. There's some disagreement from producers there about the sheet market being soft. One mill says order books are filling at a faster rate than they were at this time last year. Warehouses in the area, however, are heavily stocked with hot- and cold-rolled sheets and bars.

Tinplate continues as a capacity item with demand exceeding output. Some mills see this product as a sellout for remainder of the year.

While mill inventories of tinplate are high at **Pittsburgh,** it's felt shipments will really hit their stride in March. February orders are shaping up much better than January's.

PIPE AND TUBING . . . Small buttweld tubing is available at **Chicago** for about 3 week delivery However, it's the only product in this market which is in such a favorable supply position. Large seamless pipe has a 90-day carryover and smaller size seamless a 45-day carryover. Electric weld is in similar status. Some producers state large diameter electric and seamless weld pipe are sold out through 1959.

Purchasing Agent's Checklist

SPECIAL REPORT: Barge shipping is riding boom currents ..... p. 35

PRODUCTION: Foundries are feeling the price squeeze ..... p. 40

MANUFACTURING: Market stability for plate and structurals is coming ..... p. 42

WAREHOUSES: Only shortages are products used in capital goods expansion programs ..... p. 44

Comparison of Prices

(Effective Jan. 22, 1957)

Steel prices on this page are the average of various f.o.b. quotations of major producing areas: Pittsburgh, Chicago, Gary, Cleveland, Youngstown.

Price advances over previous week are printed in Heavy Type; declines appear in *Italics*.

	Jan. 22 1957	Jan. 15 1957	Dec. 25 1956	Jan. 24 1956
Flat-Rolled Steel: (per pound)				
Hot-rolled sheets	4.675¢	4.675¢	4.675¢	4.325¢
Cold-rolled sheets	5.75	5.75	5.75	5.325
Galvanized sheets (10 ga.)	6.30	6.30	6.30	5.85
Hot-rolled strip	4.675	4.675	4.675	4.325
Cold-rolled strip	6.870	6.870	6.870	6.29
Plate	4.87	4.87	4.87	4.52
Plates, wrought iron	10.40	10.40	10.40	10.40
Stainl's C-R strip (No. 302)	50.00	50.00	50.00	44.50
Tin and Terneplate: (per base box)				
Tinplate (1.50 lb.) cokes	$9.95	$9.95	$9.95	$9.05
Tinplates, electro (0.50 lb.)	8.65	8.65	8.65	7.75
Special coated mfg. ternes	9.20	9.20	9.20	7.85
Bars and Shapes: (per pound)				
Merchant bars	5.075¢	5.075¢	5.075¢	4.65¢
Cold finished bars	6.85	6.85	6.85	5.90
Alloy bars	6.125	6.125	6.125	5.65
Structural shapes	5.00	5.00	5.00	4.60
Stainless bars (No. 302)	43.25	43.25	43.25	38.25
Wrought iron bars	11.50	11.50	11.50	11.50
Wire: (per pound)				
Bright wire	7.20¢	7.20¢	7.20¢	6.25¢
Rails: (per 100 lb.)				
Heavy rails	$5.075	$5.075	$5.075	$4.725
Light rails	6.00	6.00	6.00	5.65
Semifinish Steel: (per net ton)				
Rerolling billets	$74.00	$74.00	$74.00	$68.50
Slabs, rerolling	74.00	74.00	74.00	68.50
Forging billets	91.50	91.50	91.50	84.50
Alloy blooms, billets, slabs	107.00	107.00	107.00	98.00
Wire Rod and Skelp: (per pound)				
Wire rods	5.80¢	5.80¢	5.80¢	5.025¢
Skelp	4.225	4.225	4.225	4.225
Finished Steel Composite: (per pound)				
Base price	5.622¢	5.622¢	5.622¢	5.174¢

	Jan. 22 1957	Jan. 15 1957	Dec. 25 1956	Jan. 24 1956
Pig Iron: (per gross ton)				
Foundry, del'd Phila.	$66.88	$66.88	$67.76	$63.69
Foundry, Valley	63.00	63.00	63.00	59.00
Foundry, Southern Cin'ti	67.17	67.17	67.17	62.93
Foundry, Birmingham	59.00	59.00	59.00	55.00
Foundry, Chicago	63.00	63.00	63.00	59.00
Basic del'd Philadelphia	66.38	66.38	66.84	62.77
Basic Valley furnace	62.50	62.50	62.50	58.50
Malleable, Chicago	63.00	63.00	63.00	59.00
Malleable, Valley	63.00	63.00	63.00	59.00
Ferromanganese, cents per lb‡ 74 to 76 pct Mn base.	12.75¢	12.75¢	11¾-12¾¢	9.50¢
Pig Iron Composite: (per gross ton)				
Pig iron	$62.90	$62.90	$63.04	$59.09
Scrap: (per gross ton)				
No. 1 steel, Pittsburgh	*$59.50*	$61.50	$65.50	$50.50
No. 1 steel, Phila. area	58.50	58.50	62.50	52.50
No. 1 steel, Chicago	*55.50*	57.50	62.50	49.50
No. 1 bundles, Detroit	*49.50*	51.50	60.50	47.50
Low phos., Youngstown	*62.50*	65.50	70.50	55.50
No. 1 mach'y cast, Pittsburgh	60.50	60.50	61.50	55.50
No. 1 mach'y cast, Philadel'a	60.50	60.50	60.50	57.50
No. 1 mach'y cast, Chicago	*54.50*	55.50	57.50	54.50
Steel Scrap Composite: (per gross ton)				
No. 1 heavy melting scrap	*$57.83*	$59.17	$63.50	$50.83
Coke, Connellsville: (per net ton at oven)				
Furnace coke, prompt	*$15.38*	$15.50	$15.50	$14.25
Foundry coke, prompt	*$17.50-$19*	$18-19	$18-19	$16.25
Nonferrous Metals: (cents per pound to large buyers)				
Copper, electrolytic, Conn.	36.00	36.00	36.00	43.00
Copper, Lake, Conn.	36.00	36.00	36.00	43.00
Tin, Straits, New York	101.75†	101.00	102.25	104.00
Zinc, East St. Louis	13.50	13.50	13.50	13.50
Lead, St. Louis	15.80	15.80	15.80	15.80
Aluminum, virgin ingot	27.10	27.10	27.10	24.40
Nickel, electrolytic	74.00	74.00	64.50	64.50
Magnesium, ingot	36.00	36.00	36.00	33.25
Antimony, Laredo, Tex.	33.00	33.00	33.00	33.00

† Tentative. ‡ Average * Revised.

Finished Steel Composite

Weighted index based on steel bars, shapes, plates, wire, rails, black pipe, hot and cold rolled sheets and strips.

Pig Iron Composite

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Birmingham.

Steel Scrap Composite

Averages of No. 1 heavy melting steel scrap delivered to consumers at Pittsburgh, Philadelphia and Chicago.

PIG IRON

Dollars per gross ton, f.o.b., subject to switching charges.

←To identify producers, see Key on P. 132→

Producing Point	Basic	Fdry.	Mall.	Bess.	Low Phos.
Birdsboro, Pa. *B6*	64.50	65.00	65.50	66.00	.....
Birmingham *R3*	58.50	59.00*	.....	.....	.....
Birmingham *W9*	58.50	59.00*	63.00	.....	.....
Birmingham *U4*	58.50	59.00*	63.00	.....	.....
Buffalo *R3*	62.50	63.00	63.50	64.00	.....
Buffalo *H1*	62.50	63.00	63.50	.....	.....
Buffalo *W6*	62.50	63.00	63.50	64.00	.....
Chester *P2*	64.50	65.00	65.50	.....	.....
Chicago *I4*	62.50	63.00	63.00	63.50	.....
Cleveland *A5*	62.50	63.00	63.00	63.50	67.50†
Cleveland *R3*	62.50	63.00	63.00	63.50	.....
Duluth *I4*	62.50	63.00	63.00	63.50	67.50†
Erie *I4*	62.50	63.00	63.00	63.50	67.50†
Everett *M6*	.....	65.00	65.50	.....	.....
Fontana *K1*	70.50	71.00	.....	.....	.....
Geneva, Utah *C7*	62.50	63.00	.....	.....	.....
Granite City *G2*	64.40	64.90	65.40	.....	.....
Hubbard *Y1*	.....	.....	63.00	.....	.....
Lone Star *L3*	58.50‡	59.00‡	.....	.....	.....
Midland *C11*	62.50	.....	.....	.....	.....
Minnequa *C6*	64.50	65.00	65.50	.....	.....
Monessen *P6*	62.50	.....	.....	.....	.....
Neville Is. *P4*	62.50	63.00	63.00	63.50	67.50†
N. Tonawanda *T1*	.....	63.00	63.50	64.00	.....
Pittsburgh *U1*	62.50	.....	63.00	63.50	.....
Sharpsville *S3*	62.50	63.00	63.00	63.50	.....
So. Chicago *R3*	62.50	63.00	63.00	.....	.....
Swedeland *A2*	64.50	65.00	65.50	65.50	.....
Toledo *I4*	62.50	63.00	63.00	63.50	.....
Troy, N. Y. *R3*	64.50	65.00	65.50	66.00	70.50
Youngstown *Y1*	.....	.....	63.00	63.50	.....

DIFFERENTIALS: Add, 50¢ per ton for each 0.25 pct silicon or portion thereof over base (1.75 to 2.25 pct except low phos., 1.75 to 2.00 pct) 50¢ per ton for each 0.50 pct manganese or portion thereof over 1 pct, $2 per ton for 0.5 to 0.75 pct nickel, $1 for each additional 0.25 pct nickel. * Add $1.00 for 0.31-0.69 pct phos. † Intermediate low phos. ‡ Add $1.00 for 0.31 to 0.50 pct phos.

Silvery Iron: Buffalo, *H1*, $72.50; **Jackson,** *J1*, *I4* **(Globe Div.),** $71.50; **Niagara Falls** (15.01-15.50), $99.50; **Keokuk** (14.01-14.50), $110.00; (15.51-16.00), $105.00. Add $1.25 per ton for each 0.50 pct silicon over base (6.01 to 6.50 pct) up to 14 pct. Add 75¢ for each 0.50 pct manganese over 1.00 pct. Bessemer silvery pig iron (under .10 pct phos.): $64.00. Add $1.00 premium for all grades silvery 6 pct to 14 pct.

STAINLESS STEEL

Base price cents per lb f.o.b. mill

Product	201	202	301	302	303	304	316	321	347	403	410	416	430
Ingots, reroll.	21.25	22.75	22.25	24.25	—	26.00	38.25	31.00	35.50	—	16.00	27.75	16.25
Slabs, billets	26.00	29.00	27.00	30.25	30.75	32.00	47.50	38.50	44.75	—	20.75	—	21.00
Billets, forging	—	35.00	35.75	36.50	39.50	39.00	59.75	45.25	53.50	30.75	27.25	27.75	27.75
Bars, struct.	—	41.25	42.50	43.25	46.25	46.00	70.25	53.25	62.25	36.25	32.50	33.00	33.50
Plates	—	43.25	44.50	45.50	48.00	48.75	73.75	57.50	67.00	38.75	33.75	35.50	34.50
Sheets	46.75	47.25	49.25	50.00	—	53.25	78.25	63.00	76.25	46.50	38.75	46.50	39.25
Strip, hot-rolled	34.50	37.50	35.75	39.00	—	42.50	66.50	51.50	61.00	—	29.75	—	30.75
Strip, cold-rolled	43.25	47.25	45.75	50.00	—	53.25	78.25	63.00	76.25	46.50	38.75	46.50	39.25
Wire CF; Rod HR	—	39.25	40.25-40.50	41.00-41.25	44.00	43.75	66.75-67.00	50.50-51.00	59.25-59.50	34.50	31.00	31.50	31.50

STAINLESS STEEL PRODUCING POINTS:

Sheets: Midland, Pa., *C11;* Brackenridge, Pa., *A3;* Butler, Pa., *A7;* Vandergrift, Pa., *U1;* Washington, Pa., *W2, J1;* Baltimore, *E1;* Middletown, O., *A7;* Massillon, O., *R3;* Gary, *U1;* Bridgeville, Pa., *U2;* New Castle, Ind., *I2;* Ft. Wayne, *J4;* Philadelphia, *D5.*

Strip: Midland, Pa., *C11;* Waukegan, Cleveland, *A5;* Carnegie, Pa., *S9;* McKeesport, Pa., *F1;* Reading, Pa., *C2;* Washington, Pa., *W2;* W. Leechburg, Pa., *A3;* Bridgeville, Pa., *U2;* Detroit, *M2;* Canton-Massillon, O., *R3;* Harrison, N. J., *D3;* Youngstown, *C5;* Sharon, Pa., *S1;* Butler, Pa., *A7;* Wallingford, Conn., *U3* (plus further conversion extras); *W1* New Bedford, Mass. (*.25¢ per lb higher*), *R6;* Gary, *U1* (*.25¢* per lb higher).

Bar: Baltimore, *A7;* S. Duquesne, Pa., *U1;* Munhall, Pa., *U1;* Reading, Pa., *C2;* Titusville, Pa., *U2;* Washington, Pa., *J2;* McKeesport, Pa., *U1, F1;* Bridgeville, Pa., *U2;* Dunkirk, N. Y., *A3;* Massillon, O., *R3;* S. Chicago, *U1;* Syracuse, N. Y., *C11;* Watervliet, N. Y., *A3;* Waukegan, *A5;* Canton, O., *T5;* Ft. Wayne, *I4;* Philadelphia, *D5;* Detroit, *R5;* Gary, *U1.*

Wire: Waukegan, *A5;* Massillon, O., *R3;* McKeesport, Pa., *F1;* Ft. Wayne, *J4;* Harrison, N. J., *D3;* Baltimore, *A7;* Dunkirk, *A3;* Monessen, *P1;* Syracuse, *C11;* Bridgeville, *U2.*

Structurals: Baltimore, *A7;* Massillon, O., *R3;* Chicago, Ill., *J4;* Watervliet, N. Y., *A3;* Syracuse, *C11;* S. Chicago, *U1.*

Plates: Brackenridge, Pa., *A3;* Chicago, *U1;* Munhall, Pa., *U1;* Midland, Pa., *C11;* New Castle, Ind., *I2;* Middletown, *A7;* Washington, Pa., *J2;* Cleveland, Massillon, *R3;* Coatesville, Pa., *C15;* Philadelphia, *D5;* Vandergrift, Pa., *U1;* Gary, *U1.*

Forgings billets: Midland, Pa., *C11;* Baltimore, *A7;* Washington, Pa., *J2;* McKeesport, *F1;* Massillon, Canton, O., *R3;* Watervliet, *A3;* Pittsburgh, Chicago, *U1;* Syracuse, *C11;* Detroit, *R5;* Munhall, Pa., S. Chicago, *U1.*

IRON AND STEEL SCRAP MARKETS

Market Continues to Falter

Dealers hesitate to hold scrap at present prices . . . Many will take a slight decline rather than keep heavy capital tied up in scrap inventory . . . Export still strong factor.

◆ PRICES continued their downward trend across the country. In most major consuming areas, steelmaking grades were off $1 to $2. Railroad grades are taking an even stronger beating.

Only the severe cold weather, which hampered collections to a significant extent, prevented more serious declines. This is particularly true in the East, where scarcely any scrap was moving into dealer yards.

But the continued decline is no mystery. Mills are relatively comfortable and dealers know it. On the other hand, few dealers will hold scrap at present high prices. In spite of declines in recent weeks, prices are still high and most of the trade is ready to accept moderate declines if it means keeping their inventory moving.

In fact, the price of scrap itself is a strong motivating force in the market. Dealers don't want to invest too much in an inventory at today's prices.

Some of the trade may be too pessimistic over the steel market. In spite of some bearish talk, there is little to indicate a decline in steelmaking rates of any significant extent. There is no doubt, however, that some pessimism over steel operations has contributed to the rate with which prices have dropped, particularly in the past two weeks.

Export continues strong in most ports. An exception is Boston, where lack of facilities is the hampering factor. Export may not be as strong as it was a few months ago, but it still is a strong factor in coastal markets.

THE IRON AGE Composite again declined as a result of drops in Chicago and Pittsburgh. It now stands at $57.83.

Pittsburgh . . . Continued weakness shows in this market although there is little activity to peg the exact level. On appraisal, No. 1 heavy melting is down $2. No. 2 dealer bundles are off $3 on mill buying. Low phos is down $1 on a mill purchase; turnings are off $1 to $2. No. 1 railroad heavy melting and No. 1 factory bundles are off $1 in sympathy with the rest of the market. The general drop seems to be the result of reduced buying. Brokers likewise appear to be waiting out the market. On the other hand, dealer collections and shipment have been slow.

Chicago . . Prices of most major grades slipped down another $2. Two major mills purchased steelmaking grades without difficulty. Railroad grades were hit slightly harder, with drops off $3 on much of the list. Reroller rails are particularly hard hit, with major buyers out of the market entirely. Cast held somewhat better, reflecting a fairly high rate of foundry activity locally.

Philadelphia . . . Prices are holding level, but most of the talk has a bearish tone. Severe winter weather cut collections, and even though there is little purchasing activity, there is little scrap in dealer yards. Feeling is, however, that few will hold onto scrap at present prices and scrap will move at lower prices before too much resistance sets in. At least two cargoes for export are scheduled for next month, with some attempt being made to fill them at slightly lower prices.

New York . . . Prices are holding this week although the market is slightly on the weaker side. Dealers are not eager to hold on to scrap at present prices. Some actually don't have the money to keep large inventories at prices, which, in spite of recent declines, are still relatively high.

Detroit . . . No. 1 grades dropped another $2 this week as the market continued to reflect a growing softness here. Continued mill resistance is the main cause of the drop. Both brokers and dealers are waiting for major auto lists to close next week for a real test of the market. Tonnages available on the February lists are not expected to be as big as they were this month.

Cleveland . . . The market continued its nosedive by $3 as buyers continued to stay out of the market. Major brokers concede they don't know of a single new order on anyone's books. One Valley mill which has been out of the market for some time turned down a heavy tonnage of No. 1 at $60, and another electric furnace mill did the same.

Birmingham . . . The market continues dull, but dealers report a nominal movement, particularly in cast grades, at unchanged prices. There was some activity in electric furnace grades, but the market has a weak tone. Prices of specialty items are declining. Exporters are out of the market at most ports, and some Carolina ports are still embargoed.

St. Louis . . . Steel mills find themselves in the position of having on the ground or on order enough scrap to cover their operations for the next 60 days. This has resulted in some price cuts ranging from $2 to $9.

Cincinnati . . . The market settled another $1 based on broker buying against old orders. It will probably drop more in the next few weeks. With the end of inclement weather, collections and yard operations are good, although there is little dealer inventory accumulation.

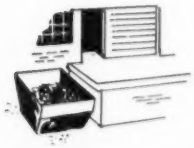
Buffalo . . . Steelmaking grades are off $2 a ton due to a general weakness that pervades the market. Machine shop turnings, mixed borings and turnings, shoveling turnings and cast iron borings are off $1 a ton. Mills are generally in a position to hold off buying at present high prices. Snows and cold weather have halted flow of scrap to yards.

Boston . . . The market is slightly off in the absence of much activity. Export is also poor, chiefly because of lack of shipping facilities. General tone of the market is weaker.

West Coast . . . Prices are holding firm in all three West Coast areas. Mills have built up their inventories to a comfortable level. However, exporting continues at a feverish pace.

BRINGS YOU GREATER RETURNS, CEMENTS CUSTOMER RELATIONS

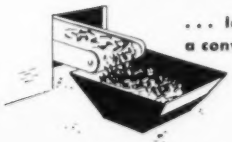
You can readily adapt the Load Lugger System to suit the needs of your individual customers . . .



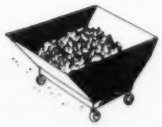
spot containers next to docks . . .

. . . on docks . . .

. . . for wheelbarrow loading . . .



. . . loading from a conveyor . . .



. . . place them on dollies . . .

or in many other ways inside or outside your customer's plant.

The LOAD LUGGER® System of scrap handling

Here's how . . .

You spot individual Load Lugger containers in or near strategic work areas at a customer's plant. When full*, you pick them up with your Load Lugger equipped truck, replace them with empties—and just *one* rig services many containers. You need fewer trucks, fewer drivers. Your need for a crane and crew outside the yard is practically eliminated.

At your customer's plant each type of scrap accumulates in its individual Load Lugger container. When you pick them up your sorting has been done for you automatically, by your customer. Result? Your sorting costs are way, way down from what they were before you installed the Load Lugger system. So, you can pay higher prices for your customer's scrap. This—plus the fact that your Load Lugger service frees valuable storage space for him, gives him neater work and storage areas, reduces chances for accidents—gives you a customer-relationship that's practically competition-proof.

*In a 6 to 12 yard Load Lugger container you can handle 18,000 pound loads.

Photo courtesy Rueben R. Graff Co. Chicago

If you are not a Load Lugger user, it will pay you to investigate now—no obligation.

Get your copy of Bulletin 1056 "OPENS DOORS TO MORE BUSINESS"

LOAD LUGGER® A BORG-WARNER TRADE MARK

Ingersoll KALAMAZOO DIV.
BORG-WARNER CORPORATION
1851 North Pitcher Street, Kalamazoo, Michigan
Telephone 5-3501
EXPORT SALES: BORG-WARNER INTERNATIONAL CORP., CHICAGO

Scrap Prices *(Effective Jan. 22, 1957)*

Pittsburgh

No. 1 hvy. melting	$59.00 to $60.00
No. 2 hvy. melting	53.00 to 54.00
No. 1 dealer bundles	59.00 to 60.00
No. 1 factory bundles	66.00 to 67.00
No. 2 bundles	46.00 to 47.00
Machine shop turn.	40.00 to 41.00
Mixed bor. and ms. turn.	40.00 to 41.00
Shoveling turnings	44.00 to 45.00
Cast iron borings	44.00 to 45.00
Low phos. punch'gs plate	67.00 to 68.00
Heavy turnings	54.00 to 55.00
No. 1 RR hvy. melting	63.00 to 64.00
Scrap rails, random lgth.	75.00 to 76.00
Rails 2 ft and under	79.00 to 80.00
RR steel wheels	71.00 to 72.00
RR. spring steel	71.00 to 72.00
RR. couplers and knuckles	71.00 to 72.00
No. 1 machinery cast.	60.00 to 61.00
Cupola cast.	53.00 to 54.00
Heavy breakable cast.	51.00 to 52.00

Chicago

No. 1 hvy. melting	$55.00 to $56.00
No. 2 hvy. melting	45.00 to 46.00
No. 1 dealer bundles	56.00 to 57.00
No. 1 factory bundles	61.00 to 62.00
No. 2 bundles	43.00 to 44.00
Machine shop turn.	37.00 to 38.00
Mixed bor. and turn.	39.00 to 40.00
Shoveling turnings	39.00 to 40.00
Cast iron borings	39.00 to 40.00
Low phos. forge crops	67.00 to 68.00
Low phos. punch'gs plate	62.00 to 63.00
Low phos. 3 ft and under	61.00 to 62.00
No. 1 RR hvy. melting	62.00 to 63.00
Scrap rails, random lgth.	73.00 to 75.00
Rerolling rails	75.00 to 77.00
Rails 2 ft and under	79.00 to 80.00
Locomotive tires, cut	65.00 to 66.00
Cut bolsters & side frames	65.00 to 66.00
Angles and splice bars	70.00 to 71.00
RR. steel car axles	83.00 to 84.00
RR. couplers and knuckles	64.00 to 65.00
No. 1 machinery cast.	54.00 to 55.00
Cupola cast.	50.00 to 51.00
Heavy breakable cast.	47.00 to 48.00
Cast iron brake shoe	46.00 to 47.00
Cast iron wheels	56.00 to 57.00
Malleable	70.00 to 71.00
Stove plate	47.00 to 48.00
Steel car wheels	63.00 to 65.00

Philadelphia Area

No. 1 hvy. melting	$58.00 to $59.00
No. 2 hvy. melting	50.00 to 51.00
No. 1 dealer bundles	58.00 to 59.00
No. 2 bundles	48.00 to 49.00
Machine shop turn.	42.00 to 43.00
Mixed bor. short turn.	43.00 to 44.00
Cast iron borings	43.00 to 44.00
Shoveling turnings	46.00 to 47.00
Clean cast chem. borings	49.00 to 50.00
Low phos. 5 ft and under	63.00 to 64.00
Low phos. 2 ft and under	65.00 to 66.00
Low phos. punch'gs	65.00 to 66.00
Elec. furnace bundles	63.00 to 64.00
Heavy turnings	54.00 to 55.00
RR. steel wheels	71.00 to 72.00
RR. spring steel	71.00 to 72.00
Rails 18 in. and under	80.00 to 81.00
Cupola cast.	53.00 to 56.00
Heavy breakable cast.	58.00 to 59.00
Cast iron car wheels	64.00 to 65.00
Malleable	66.00 to 67.00
Unstripped motor blocks	44.00 to 45.00
No. 1 machinery cast.	60.00 to 61.00

Cleveland

No. 1 hvy. melting	$58.00 to $59.00
No. 2 hvy. melting	50.00 to 51.00
No. 1 dealer bundles	58.00 to 59.00
No. 1 factory bundles	63.00 to 64.00
No. 2 bundles	41.00 to 42.00
No. 1 busheling	58.00 to 59.00
Machine shop turn.	32.00 to 33.00
Mixed bor. and turn.	35.00 to 36.00
Shoveling turnings	35.00 to 36.00
Cast iron borings	35.00 to 36.00
Cut struct'r'l & plates, 2 ft & under	66.00 to 67.00
Drop forge flashings	58.00 to 59.00
Low phos. punch'gs, plate	59.00 to 60.00
Foundry steel, 2 ft & under	58.00 to 59.00
No. 1 RR. heavy melting	62.00 to 63.00
Rails 2 ft and under	76.00 to 77.00
Rails 18 in. and under	77.00 to 78.00
Railroad grade bars	42.00 to 43.00
Steel axle turnings	40.00 to 41.00
Railroad cast.	60.00 to 61.00
No. 1 machinery cast.	58.00 to 59.00
Stove plate	51.00 to 52.00
Malleable	66.00 to 67.00

Iron and Steel Scrap

Going prices of iron and steel scrap as obtained in the trade by THE IRON AGE based on representative tonnages. All prices are per gross ton delivered to consumer unless otherwise noted.

Youngstown

No. 1 hvy. melting	$61.00 to $62.00
No. 2 hvy. melting	50.00 to 51.00
No. 1 dealer bundles	61.00 to 62.00
No. 2 bundles	44.00 to 45.00
Machine shop turn.	32.00 to 33.00
Shoveling turnings	38.00 to 39.00
Cast iron borings	37.00 to 38.00
Low phos. plate	62.00 to 63.00

Buffalo

No. 1 hvy. melting	$58.00 to $59.00
No. 2 hvy. melting	48.00 to 49.00
No. 1 busheling	58.00 to 59.00
No. 1 dealer bundles	58.00 to 59.00
No. 2 bundles	43.00 to 44.00
Machine shop turn.	33.00 to 34.00
Mixed bor. and turn.	37.00 to 38.00
Shoveling turnings	36.00 to 37.00
Cast iron borings	34.00 to 35.00
Low phos. plate	63.00 to 64.00
Scrap rails, random lgth.	63.00 to 64.00
Rails 2 ft and under	79.00 to 80.00
RR. steel wheels	65.00 to 66.00
RR. spring steel	60.00 to 61.00
RR. couplers and knuckles	74.00 to 75.00
No. 1 machinery cast.	54.00 to 55.00
No. 1 cupola cast.	48.00 to 49.00

Detroit

Brokers buying prices per gross ton, on cars:

No. 1 hvy. melting	$49.00 to $50.00
No. 2 hvy. melting	42.00 to 43.00
No. 1 dealer bundles	49.00 to 50.00
No. 2 bundles	38.00 to 39.00
New busheling	49.00 to 50.00
Drop forge flashings	48.50 to 49.50
Machine shop turn.	29.00 to 30.00
Mixed bor. and turn.	32.00 to 33.00
Shoveling turnings	32.00 to 33.00
Cast iron borings	32.00 to 33.00
Low phos. punch'gs, plate	49.00 to 50.00
No. 1 cupola cast.	51.00 to 52.00
Heavy breakable cast.	44.00 to 45.00
Stove plate	45.00 to 46.00
Automotive cast.	54.00 to 55.00

St. Louis

No. 1 hvy. melting	$53.00 to $54.00
No. 2 hvy. melting	46.50 to 47.50
No. 1 dealer bundles	53.00 to 54.00
No. 2 bundles	41.50 to 42.50
Machine shop turn.	35.00 to 36.00
Cast iron borings	39.00 to 40.00
Shoveling turnings	38.00 to 39.00
No. 1 RR. hvy. melting	56.00 to 57.00
Rails, random lengths	71.00 to 72.00
Rails 18 in. and under	81.00 to 83.00
Locomotive tires uncut	61.00 to 62.00
Angles and splice bars	63.00 to 64.00
Std. steel car axles	78.00 to 79.00
RR. specialties	63.00 to 64.00
Cupola cast.	49.00 to 50.00
Heavy breakable cast.	42.50 to 43.50
Cast iron brake shoes	52.00 to 53.00
Stove plate	42.00 to 43.00
Cast iron car wheels	54.00 to 55.00
Rerolling rails	73.00 to 74.00
Unstripped motor blocks	42.50 to 43.50

Boston

Brokers buying prices per gross ton, on cars:

No. 1 hvy. melting	$50.00 to $51.00
No. 2 hvy. melting	39.50 to 40.50
No. 1 dealer bundles	50.00 to 51.00
No. 2 bundles	39.50 to 40.50
No. 1 busheling	50.00 to 51.00
Elec. furnace, 3 ft & under	54.50 to 55.50
Machine shop turn.	32.50 to 33.50
Mixed bor. and short turn.	33.50 to 34.50
Shoveling turnings	37.00 to 38.00
Clean cast chem. borings	38.00 to 39.00
No. 1 machinery cast.	47.00 to 48.00
Mixed cupola cast.	42.50 to 43.50
Heavy breakable cast.	46.00 to 47.00
Stove plate	41.00 to 42.00
Unstripped motor blocks	33.00 to 34.00

New York

Brokers buying prices per gross ton, on cars:

No. 1 hvy. melting	$53.00 to 54.00
No. 2 hvy. melting	45.00 to 46.00
No. 2 dealer bundles	42.00 to 43.00
Machine shop turn.	34.00 to 35.00
Mixed bor. and turn.	37.00 to 38.00
Shoveling turnings	38.00 to 39.00
Clean cast chem. borings	33.00 to 34.00
No. 1 machinery cast.	51.00 to 52.00
Mixed yard cast.	48.00 to 49.00
Charging box cast.	48.00 to 49.00
Heavy breakable cast.	49.00 to 50.00
Unstripped motor blocks	39.00 to 40.00

Birmingham

No. 1 hvy. melting	$46.00 to $47.00
No. 2 hvy. melting	44.00 to 45.00
No. 1 dealer bundles	46.00 to 47.00
No. 2 bundles	38.00 to 39.00
No. 1 busheling	46.00 to 47.00
Machine shop turn.	37.00 to 38.00
Shoveling turnings	38.00 to 39.00
Cast iron borings	27.00 to 28.00
Electric furnace bundles	54.00 to 55.00
Bar crops and plate	61.00 to 62.00
Structural and plate, 2 ft	60.00 to 61.00
No. 1 RR. hvy. melting	61.00 to 62.00
Scrap rails, random lgth.	68.00 to 69.00
Rails, 18 in. and under	74.00 to 75.00
Angles & splice bars	66.00 to 67.00
Rerolling rails	74.00 to 75.00
No. 1 cupola cast.	52.00 to 53.00
Stove plate	51.00 to 52.00
Charging box cast.	40.00 to 41.00
Cast iron car wheels	45.00 to 46.00
Unstripped motor blocks	44.00 to 45.00
Mashed tin cans	15.00 to 16.00
Elec. furnace, 2 ft & under	54.00 to 55.00

Cincinnati

Brokers buying prices per gross ton, on cars:

No. 1 hvy. melting	$58.00 to $59.00
No. 2 hvy. melting	48.00 to 49.00
No. 1 dealer bundles	58.00 to 59.00
No. 2 bundles	42.00 to 43.00
Machine shop turn.	39.00 to 40.00
Mixed bor and turn.	37.00 to 38.00
Shoveling turnings	42.00 to 43.00
Cast iron borings	37.50 to 38.50
Low phos. 18 in. & under	64.00 to 65.00
Rails, random lengths	70.00 to 71.00
Rails, 18 in. and under	78.00 to 79.00
No. 1 cupola cast.	47.00 to 48.00
Hvy. breakable cast.	47.00 to 48.00
Drop broken cast.	57.00 to 58.00

San Francisco

No. 1 hvy. melting	$59.00
No. 2 hvy. melting	57.00
No. 1 dealer bundles	58.00
No. 2 bundles	44.00
Machine shop turn.	$37.00 to 38.00
Cast iron borings	38.00
No. 1 RR. hvy. melting	60.00
No. 1 cupola cast.	60.00

Los Angeles

No. 1 hvy. melting	$59.00
No. 2 hvy. melting	57.00
No. 1 dealer bundles	58.00
No. 2 bundles	40.00
Machine shop turn.	37.00
Shoveling turnings	40.00
Cast iron borings	37.00
Elec. furn. 1 ft. and under (foundry)	70.00
No. 1 RR. hvy. melting	60.00
No. 1 cupola cast.	60.00

Seattle

No. 1 hvy. melting	$59.00
No. 2 hvy. melting	54.00
No. 2 bundles	$33.00 to 35.00
No. 1 cupola cast.	55.00
Mixed yard cast.	55.00

Hamilton, Ont.

No. 1 hvy. melting	$54.00
No. 2 hvy. melting	47.00
No. 1 dealer bundles	54.00
No. 2 bundles	40.50
Mixed steel scrap	46.00
Bushelings	39.50
Bush., new fact., prep'd.	52.00
Bush., new fact., unprep'd.	48.00
Machine shop turn.	31.00
Short steel turn.	35.00
Mixed bor. and turn.	28.00
Rails, rerolling	60.00
Cast scrap	50.00

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OF
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IN
IRON & STEEL
SCRAP
SINCE
1889

Luria Brothers and Company, Inc.

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EXPORTS-IMPORTS LIVINGSTON & SOUTHARD, INC. 99 Park Ave., New York, N. Y. *Cable Address:* FORENTRACO

NONFERROUS MARKETS

Brass Mills Fight Imports

Some brass mill products badly undersold by foreign competition . . . Connecticut congressman introduces bill for quotas-tariffs . . . Assn. studying the problem.

◆ REP. JAMES T. PATTERSON (R.—Conn.) has turned the spotlight on the competition of foreign products in the brass mill products markets.

The Connecticut congressman (1) announced that he has introduced a bill to combine quotas with a protective tariff to protect the brass mills against foreign competition (now in the House Ways and Means Committee) and, (2) revealed that the Copper and Brass Research Assn. is preparing a study for presentation to the Office of Defense Mobilization showing the effect of foreign competition on U. S. brass mills. (P. 144.)

However, the problem is still a long way from solved. In fact it hasn't yet been defined.

The fact that there is competition from import that really hurts is generally accepted. Rep. Patterson points up the case where offers by 11 domestic brass mills to supply the General Services Administration with 17,156 lbs. of red brass condensor tubes were underbid by Atlantic Steel and Iron Co., which has a foreign source of supply.

Reading Tube Corp., Reading, Pa., says it is "definitely being hurt by foreign competition."

Bridgeport Brass Co., Bridgeport, Conn., says it is feeling the squeeze, especially in tube markets where they are being undersold by as much as 12¢ per lb.

However, the problem does not include all brass mill products. Some of the larger, more diversified brass mills confide that foreign competition has little effect on their sales.

Here's a good example. While Bridgeport Brass reports foreign competition has taken over as much as 80 pct of the market for light gage tubing, Copper & Brass Research Assn. states that in 1956 total foreign imports were only 4½ pct of domestic shipments of brass mill products.

The answer to this part of the problem will probably be supplied by the study now in progress at the Association. However, it will be a matter of months until this is ready.

Industry opinion is that the bill introduced by Rep. Patterson has little chance of doing any good. Other bills with similar intention were introduced in the last session of Congress and never got out of committee. Even if the Patterson bill gets to the floor, it stands little chance of passage in the light of the free trade policy of the administration.

Salvation for the segment of the brass mills being hit probably lies with the Association report to ODM. Under public law 86, as amended by the 84th congress, if ODM director Arthur Flemming is convinced by the report that the foreign competition constitutes a "threat to impair national security" he will notify the President who has the power to call an investigation. President Eisenhower may then take action in adjusting a quota.

Despite the disagreement on the seriousness of the problem and the prospective solution, there are several things on which the brass mill industry agrees: (1) no matter how serious the problem is now, it will get progressively more serious unless something is done. (2) whatever action is decided on will have to be taken before June 30 when tariffs on many brass mill products will be reduced 17 pct under the 1955 trade law.

Primary Prices

(cents per lb)	current price	last price	date of change
Aluminum ingot	27.10	25.90	8/10/56
Aluminum pig	26.00	24.00	8/10/56
Copper (E)	36.00	40.00	10/26/56
Copper (CS)	34.825	35.00	1/4/57
Copper (L)	38.00	40.00	10/27/56
Lead, St. L.	16.80	16.30	1/13/56
Lead, N. Y.	16.00	16.50	1/13/56
Magnesium ingot	36.00	34.50	8/13/56
Magnesium pig	35.25	33.75	8/13/56
Nickel	74.00	84.50	12/6/56
Titanium sponge	250-275	270-300	12/4/56
Zinc, E. St. L.	13.50	13.00	1/8/56
Zinc, N. Y.	14.00	13.50	1/8/56

ALUMINUM: 99% ingot frt allwd. COPPER: (E) = electrolytic, (CS) = custom smelters, electrolytic. (L) = lake. LEAD: common grade. MAGNESIUM: 99.8% pig. Velasco, Tex. NICKEL: Port Colbourne, Canada. ZINC: prime western. TIN: see column at right, other primary prices, pg. 128.

ALUMINUM . . . Another bill to alter the tariff on a nonferrous metal was introduced in the House of Representatives this week.

Rep. Daniel Reed (R.-N. Y.), ranking Republican on the House Appropriations Committee, wants to suspend the duty on imported aluminum and aluminum alloys.

H.R. 1224 provides duty free status for prime and secondary aluminum in crude form, alloyed bars, billets and blooms with not less than 99 pct aluminum, and alloys in crude form in which the aluminum equals the total of the alloys by weight.

In order to qualify, the metal may not be warehoused for more than one year.

Rep. Reed, the bill's sponsor, is confident that it will pass with little opposition. On the basis of past performance, there is some reason to doubt this. In the last Congress 11 such bills were introduced in the House of Representatives, and 4 in the Senate, with no action resulting.

The company which the bill would affect most, Aluminium, Ltd., is not particularly concerned whether the bill passes or not. It would not lower the price of Canadian aluminum in this country. Aluminium traditionally pegs its price the same as the American producers and pays the 1¼¢ duty out of pocket. The suspended duty would not draw any more aluminum from north of the border. And even if it would, there is no market for it right now.

Tin prices for the week: Jan. 16—102.125; Jan. 17—101.750; Jan. 18—101.250; Jan. 21—101.875; Jan. 22—101.75.*

*Estimate.

. . . with Magnethermic Induction Billet Heaters

Here's automation in an extrusion plant. Automatic billet loading, automatic billet temperature control, automatic control on the transfer of heated billets from the Magnethermic to press. These features increase quality and increase production.

These factors are influencing engineers throughout the country to specify Magnethermic Induction Heaters to meet their billet heating needs in new extrusion plants and as replacements for conventional equipment.

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3990 SIMON ROAD YOUNGSTOWN 7, OHIO
EQUIPMENT

Nonferrous Prices *(Effective Jan. 22, 1957)*

MILL PRODUCTS

(Cents per lb, unless otherwise noted)

ALUMINUM

(Base 30,000 lb, f.o.b. ship. pt., frt. allowed)

Flat Sheet (Mill Finish) and Plate

("F" temper except 6061-0)

Alloy	.032	.081	.136-.249	.250-3.
1060, 1100, 3003	44.3	42.1	40.9	40.2
5052	51.8	46.8	45.1	42.9
6061-0	48.9	44.6	42.8	42.6

Extruded Solid Shapes

Factor	6063 T-5	6062 T-6
6- 8	45.5-47.3	61.3-65.1
12-14	46.2-47.7	62.2-66.8
24-26	49.4-49.5	73.1-77.8
36-38	58.3-59.0	97.4-101.0

Screw Machine Stock—2011-T-3

Size*	¾	⅞-⅝	¾-1	1¼-1⅜
Price	59.7	58.8	57.4	55.2

Roofing Sheet, Corrugated

(Per sheet, 26" wide base, 16,000 lb)

Length"→	72	96	120	144
.019 gage	$1.352	$1.803	$2.254	$2.704
.024 gage	1.686	2.252	2.815	3.378

MAGNESIUM

(F.o.b. shipping Pt., carload frt. allowed)

Sheet and Plate

Type→ Gage→	.250-3.00	.250-2.00	.188	.081	.032
AZ31B Stand. Grade	.....	67.9	69.0	77.9	103.1
AZ31B Spec.	.....	93.3	95.7	108.7	171.3
Tread Plate	.....	70.6	71.7	.....	.....
Tooling Plate	73.0	.....	.....	.....	.....

Extruded Shapes

factor→	6-8	12-14	24-26	36-38
Comm. Grade (AZ31C)	69.6	70.7	75.6	89.3
Spec. Grade (AZ31B)	84.6	85.7	90.6	104.3

Alloy Ingot

AZ91B (Die Casting) ..... 37.25 (delivered)
AZ63A, AZ92A, AZ91C (Sand Casting) 40.75 (Velasco, Tex.)

NICKEL, MONEL, INCONEL

(Base prices, f.o.b. mill)

	"A" Nickel	Monel	Inconel
Sheet, CR	113	97	118
Strip, CR	111	99	128
Rod, bar, HR	94	80	99
Angles, HR	94	80	99
Plates, HR	107	96	111
Seamless tube	144	120	190
Shot, blocks	....	78	....

COPPER, BRASS, BRONZE

(Freight included on 5000 lbs)

	Sheet	Wire	Rod	Tube
Copper	58.13	.....	55.36	58.32
Brass, 70/30	50.19	50.73	50.13	53.10
Brass, Low	53.40	53.94	53.34	56.21
Brass, R L	54.54	55.08	54.48	57.35
Brass, Naval	54.14	.....	48.45	57.55
Munts Metal	52.19	.....	48.00	.....
Comm. Bs.	56.23	56.77	56.17	58.75
Mang. Bs.	57.88	.....	51.98	.....
Phos. Bs. 5%	77.25	.....	77.25	.....

TITANIUM

(10,000 *lb base, f.o.b. mill*)

Sheet and strip, commercially pure, $11.00-$12.10; alloy, $14.75; Plate, HR, commercially pure, $9.25-$9.75; alloy, $11.25. Wire, rolled and/or drawn, commercially pure, $8.50-$9.00; alloy, $11.00; Bar, HR or forged, commercially pure, $7.10-$7.35; alloy, $7.10-$7.30; billets, HR, commercially pure, $6.85-$7.10; alloy, $6.85-$7.05.

PRIMARY METAL

(Cents per lb, unless otherwise noted)

Antimony, American, Laredo, Tex. . 33.50
Beryllium aluminum 5% Be, Dollar per lb contained Be $74.75
Beryllium copper, per lb conta'd Be. $43.00
Beryllium 97% lump or beads, f.o.b. Cleveland, Reading $71.50
Bismuth, ton lots ..... $ 2.25
Cadmium, del'd ..... $ 1.70
Calcium, 99.9%, small lots ..... $ 4.55
Chromium, 99.8% metallic basis .. $ 1.31
Cobalt, 97-99% (per lb) ...$2.35 to $2.42
Germanium, per gm, f.o.b. Miami Okla., refined ..... $48.50-$53.50
Gold, U. S. Treas., per troy oz. $35.00
Indium, 99.9% dollars per troy oz. .$ 2.25
Iridium, dollars per troy oz. ..$90 to $100
Lithium, 98% ..... $11.00 to $14.00
Magnesium, sticks, 100 to 500 lb .. 59.00
Mercury, dollars per 76-lb flask, f.o.b. New York ..... $255 to $257
Nickel oxide sinter at Copper Cliff, Ont., contained nickel 71.25
Palladium, dollars per troy oz. $23 to $24
Platinum, dollars per troy oz. $103 to $105
Rhodium ..... $120.00 to $125.00
Silver ingots (¢ per troy oz.) 91.375
Thorium, per kg $43.00
Uranium, normal per kg $40.00
Vanadium ..... $ 3.45
Zirconium sponge $10.00

REMELTED METALS

Brass Ingot

(Cents per lb delivered, carloads)

85-5-5 ingot
No. 115 ..... 35.00
No. 120 ..... 33.75
No. 123 ..... 32.25
80-10-10 ingot
No. 305 ..... 38.50
No. 315 ..... 36.75
88-10-2 ingot
No. 210 ..... 48.75
No. 215 ..... 44.50
No. 245 ..... 40.00
Yellow ingot
No. 405 ..... 27.50
Manganese bronze
No. 421 ..... 30.75

Aluminum Ingot

(Cents per lb del'd 30,000 lb and over)

95-5 aluminum-silicon alloys
0.30 copper max. 25.00-25.75
0.60 copper max. 24.75-25.50
Piston alloys (No. 122 type) 24.25-25.25
No. 12 alum. (No. 2 grade) ..22.50-23.50
108 alloy 22.50-23.50
195 alloy 24.50-25.75
13 alloy (0.60 copper max.) ..24.75-25.50
AXS-679 ..... 22.50-23.50

Steel deoxidizing aluminum, notch bar granulated or shot
Grade 1—95-97½% 23.25-24.00
Grade 2—92-95% 22.25-23.00
Grade 3—90-92% 21.25-22.00
Grade 4—85-90% 20.25-21.00

SCRAP METALS

Brass Mill Scrap

(Cents per pound, add 1¢ per lb for shipments of 20,000 lb and over)

	Heavy	Turnings
Copper	32	31¼
Yellow brass	24⅝	22⅝
Red brass	28½	27¾
Comm. bronze	29½	28¾
Mang. bronze	23½	22¼
Yellow brass rod ends	24⅝	....

Customs Smelters Scrap

(Cents per pound carload lots, delivered to refinery)

No. 1 copper wire ..... 29¼—29½
No. 2 copper wire ..... 27¾—28
Light copper ..... 25½—25¾
*Refinery brass 26¼
*Dry copper content.

Ingot Makers Scrap

(Cents per pound carload lots, delivered to refinery)

No. 1 copper wire 29½
No. 2 copper wire 28
Light copper 25¾
No. 1 composition 27
No. 1 comp. turnings 26½
Hvy. yellow brass solids 19
Brass pipe 19
Radiators 21

Aluminum

Mixed old cast. ..... 14 —14½
Mixed new clips ..... 15½—16½
Mixed turnings, dry ..... 15 —15½

Dealer's Scrap

(Dealers' buying price f.o.b. New York in cents per pound)

Copper and Brass

No. 1 copper wire ..... 26½—27
No. 2 copper wire ..... 25 —25⅛
Light copper ..... 23½—24
Auto radiators (unsweated) . 17½—18
No. 1 composition ..... 24 —24⅛
No. 1 composition turnings .. 22½—23
Cocks and faucets ..... 18½—19
Clean heavy yellow brass .... 16 —16⅛
Brass pipe ..... 19 —19⅛
New soft brass clippings .... 21 —21⅛
No. 1 brass rod turnings .... 18 —18⅛

Aluminum

Alum. pistons and struts .... 6 — 6⅛
Aluminum crankcases ..... 11½—12
1100 (2S) aluminum clippings 15 —15⅛
Old sheet and utensils ..... 11½—12
Borings and turnings ..... 7½— 8
Industrial castings ..... 11½—12
2024 (24S) clippings ..... 13 —13⅛

Zinc

New zinc clippings ..... 7 — 7⅛
Old zinc ..... 4½— 5
Zinc routings ..... 2¾— 3
Old die cast scrap ..... 2½— 2⅝

Nickel and Monel

Pure nickle clippings ..... $1.75-$1.85
Clean nickel turnings ..... $1.50-$1.60
Nickel anodes ..... $1.75-$1.85
Nickel rod ends ..... $1.75-$1.85
New Monel clippings 75-80
Clean Monel turnings 70-75
Old sheet Monel 70-80
Nickel silver clippings, mixed 21
Nickel silver turnings, mixed 18

Lead

Soft scrap lead ..... 12½—13
Battery plates (dry) ..... 6¾— 7
Batteries, acid free ..... 4 — 4¼

Miscellaneous

Block tin ..... 77 —78
No. 1 pewter ..... 61 —62
Auto babbitt ..... 40 —41
Mixed common babbitt ..... 13 —13⅛
Solder joints ..... 18 —18½
Siphon tops 42
Small foundry type ..... 14¾—15
Monotype ..... 14 —14½
Lino. and stereotype ..... 13 —13½
Electrotype ..... 12½—12¾
Hand picked type shells ..... 9½—10
Lino. and stereo. dross ..... 4⅜— 5
Electro. dross ..... 4 — 4¼

IRON AGE

STEEL PRICES

(Effective Jan. 22, 1957)

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

		BILLETS, BLOOMS, SLABS			PILING	SHAPES STRUCTURALS			STRIP					
		Carbon Rerolling Net Ton	Carbon Forging Net Ton	Alloy Net Ton	Sheet Steel	Carbon	Hi Str. Low Alloy	Carbon Wide-Flange	Hot-rolled	Cold-rolled	Hi Str H.R. Low Alloy	Hi Str. C.R. Low Alloy	Alloy Hot-rolled	Alloy Cold-rolled
EAST	Bethlehem, Pa.			$107.00 *B3*		5.05 *B3*	7.40 *B3*	5.05 *B3*						
	Buffalo, N. Y.	$74.00 *B3, R3*	$91.50 *B3, R3*	$107.00 *B3, R3*	5.90 *B3*	5.05 *B3*	7.40 *B3*	5.05 *B3*	4.675 *B3, R3*	6.85 *R7*	6.95 *B3*			
	Claymont, Del.													14.55 *C11*
	Harrison, N. J.													
	Conshohocken, Pa.		$96.50 *A2*	$114.00 *A2*					4.725 *A2*	6.90 *A2*	6.95 *A2*			
	New Bedford, Mass.									7.30 *R6*				
	Johnstown, Pa.	$74.00 *B3*	$91.50 *B3*	$107.00 *B3*		5.05 *B3*	7.40 *B3*							
	Boston, Mass.									7.40 *T8*				14.90 *T8*
	New Haven, Conn.									7.30 *D1*				
	Baltimore, Md.									6.85 *T8*				
	Phoenixville, Pa.					5.85 *P2*		5.85 *P2*						
	Sparrows Pt., Md.								4.675 *B3*		6.95 *B3*			
	Bridgeport, Wallingford, Conn.	$79.00 *N8*	$96.50 *N8*	$107.00 *N8*						7.30 *W1* 6.95 *N8*				
	Pawtucket, R. I. Worcester, Mass.									7.48 *A5,N7*				14.90 *N7*
MIDDLE WEST	Alton, Ill.								4.875 *L1*					
	Ashland, Ky.								4.675 *A7*					
	Canton-Massillon, Dover, Ohio		$94.00 *R3*	$107.00 *R3, T5*						6.85 *G4*		10.10 *G4*		14.55 *G4*
	Chicago, Ill. Franklin Park, Ill.	$74.00 *U1, R3*	$91.50 *U1, R3,W8*	$107.00 *U1, R3,W8*	5.90 *U1*	5.00 *U1, W8*	7.35 *U1, Y1* 6.00 *W8*	5.00 *U1*	4.675 *N4* 4.675 *A1*	6.95 *A1,T8*			7.75 *W8, S9*	14.55 *A1, S9,T8*
	Cleveland, Ohio									6.85 *A5,J3*			7.75 *J3*	
	Detroit, Mich.	$74.00 *R5*		$107.00 *R5*					4.775 *G3, M2*	6.95 *M2,G3, D2,P11*	7.05 *G3*	10.10 *G3, D2*	7.75 *G3*	
	Anderson, Ind.									6.85 *G4*		10.10 *G4*		
	Duluth, Minn.													
	Gary, Ind. Harbor, Indiana	$74.00 *U1*	$91.50 *U1*	$107.00 *U1, Y1*	5.90 *I3*	5.00 *U1*	7.35 *U1,I3*	5.25 *I3*	4.675 *U1, I3,Y1*	6.85 *Y1*	6.95 *U1, I3,Y1*	10.20 *Y1*	7.75 *U1, Y1*	
	Sterling, Ill.	$74.00 *N4*							4.775 *N4*					
	Indianapolis, Ind.									7.00 *C5*				
	Newport, Ky.												7.75 *A9*	
	Middletown, Ohio													
	Niles, Warren, Ohio Sharon, Pa.		$91.50 *S1, C10*	$107.00 *S1, C10*					4.675 *S1, R3*	6.85 *T4*	6.95 *S1, R3*	10.00 *S1, R3*	7.75 *S1*	14.55 *S1*
	Pittsburgh, Pa. Midland, Pa. Butler, Pa.	$74.00 *U1*	$91.50 *U1, C11*	$107.00 *U1, C11*	5.90 *U1*	5.00 *U1, J3*	7.35 *U1, J3*	5.00 *U1*	4.675 *P6*	5.750 *P6* 6.85 *J3,B4, S7*			7.75 *S9*	14.55 *S9*
	Portsmouth, Ohio													
	Weirton, Wheeling, Follansbee, W. Va.					5.00 *W3*			4.675 *W3*	6.85 *W3,F3*	6.95 *W3*	9.65 *W3*		
	Youngstown, Ohio	$74.00 *R3*	$91.50 *Y1, C10*	$107.00 *Y1*		5.00 *Y1*	7.35 *Y1*		4.675 *U1, Y1*	6.85 *Y1,C5*	6.95 *U1, Y1*	10.20 *Y1*	7.75 *U1, Y1*	
WEST	Fontana, Cal.	$83.50 *K1*	$101.00 *K1*	$128.00 *K1*		5.75 *K1*	8.10 *K1*	5.90 *K1*	5.525 *K1*	8.70 *K1*				
	Geneva, Utah	$91.50 *C7*				5.00 *C7*	7.35 *C7*							
	Kansas City, Mo.					5.10 *S2*	7.45 *S2*		4.925 *S2*		7.20 *S2*			
	Los Angeles, Torrance, Cal.		$101.00 *B2*	$127.00 *B2*		5.70 *C7, B2*	8.05 *B2*		5.425 *B2, C7*	8.80 *C1*			8.95 *B2*	
	Minnequa, Colo.					5.30 *C6*			5.775 *C6*					
	Portland, Ore.					5.75 *O2*								
	San Francisco, Niles, Pittsburg, Cal.		$101.00 *B2*			5.65 *B2*	8.00 *B2*		5.425 *C7,B2*					
	Seattle, Wash.		$105.00 *B2*			5.75 *B2*	8.10 *B2*		5.675 *B2*					
SOUTH	Atlanta, Ga.								4.875 *A8*					
	Fairfield, Ala. City, Birmingham, Ala.	$74.00 *T2*	$91.50 *T2*			5.30 *T2,R3* 5.30 *C16*	7.35 *T2*		4.675 *T2,R3* 4.975 *C10*		6.95 *T2*			
	Houston, Lone Star, Texas	$80.00 *L3*	$96.50 *S2*	$112.00 *S2*		5.10 *S2*	7.45 *S2*		4.925 *S2*		7.20 *S2*			

STEEL PRICES

(Effective Jan. 22, 1957)

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		SHEETS									WIRE ROD	TINPLATE†		BLACK PLATE
		Hot-rolled *18* ga. & hvyr.	Cold-rolled	Galvanized	Enameling	Long Terne	Hi Str. Low Alloy H.R.	H Str. Low Alloy C.R.	Hi Str. Low Alloy Galv.	Hot-rolled *19* ga.		Cokes* *1.25*-lb. base box	Electro* *0.25*-lb. base box	Hollowware Enameling *29* ga.
EAST	Bethlehem, Pa.													
	Buffalo, N. Y.	4.675 *B3*	5.75 *B3*				6.90 *B3*	8.525 *B3*			5.80 *W6*	† Special coated mfg. terne deduct 50¢ from 1.25-lb. coke base box price, Can-making quality blackplate 55 to 128 lb. deduct $2.20 from 1.25-lb. coke base box. * COKES: 1.50-lb. add 25¢. ELECTRO: 0.50-lb. add 25¢; 0.75-lb. add 65¢; 1.00-lb. add $1.00. Differential 1.00 lb./0.25 lb. add 65¢.		
	Claymont, Del.													
	Coatesville, Pa.													
	Conshohocken, Pa.	4.725 *A2*	5.80 *A2*				6.95 *A2*							
	Harrisburg, Pa.													
	Hartford, Conn.													
	Johnstown, Pa.										5.80 *B3*			
	Fairless, Pa.	4.725 *U1*	5.80 *U1*				6.95 *U1*	8.575 *U1*				$9.80 *U1*	$8.50 *U1*	
	New Haven Conn.													
	Phoenixville, Pa.													
	Sparrows Pt., Md.	4.675 *B3*	5.75 *B3*	6.30 *B3*			6.90 *B3*	8.575 *B3*	9.275 *B3*		5.90 *B3*	$9.80 *B3*	$8.50 *B3*	
	Worcester, Mass.										6.10 *A5*			
	Trenton, N. J.													
MIDDLE WEST	Alton, Ill.										6.00 *L1*			
	Ashland, Ky.	4.675 *A7*		6.30 *A7*	6.325 *A7*									
	Canton-Massillon, Dover, Ohio			6.30 *R3,R1*										
	Chicago, Joliet, Ill.	4.675 *W8, A1*					6.90 *U1*			5.80 *K2*	5.80 *A5,R3, N4,W8, K2*			
	Sterling, Ill.										5.90 *N4, K2*			
	Cleveland, Ohio	4.675 *J3, R3*	5.75 *J3, R3*		6.325 *R3*		6.90 *R3*	8.525 *R3, J3*			5.80 *A5*			
	Detroit, Mich	4.775 *G3, M2*	5.85 *G3* 5.75 *M2*				7.00 *G2*	8.625 *G3*						
	Newport, Ky.	4.675 *A9*	5.75 *A9*											
	Gary, Ind. Harbor, Indiana	4.675 *U1, I3,Y1*	5.75 *U1, I3,Y1*	6.30 *U1, I3*	6.325 *U1, I3,Y1*	6.70 *U1*	6.90 *U1, Y1,I3*	8.525 *U1, Y1*			5.80 *Y1*	$9.70 *U1, Y1*	$8.40 *I3, U1,Y1*	7.15 *U1, Y1*
	Granite City, Ill.	4.875 *G2*	5.95 *G2*	6.50 *G2*	6.525 *G2*								$8.50 *G2*	7.25 *G2*
	Kokomo, Ind.			6.40 *C9*							5.90 *C9*			
	Mansfield, Ohio		5.75 *E2*			6.70 *E2*								
	Middletown, Ohio		5.75 *A7*	6.30 *A7*	6.325 *A7*	6.70 *A7*								
	Niles, Warren, Ohio Sharon, Pa.	4.675 *S1, R3,N3*	5.75 *R3*	6.30 *R3*	6.325 *N3*	6.70 *N3*	6.90 *S1, R3*	8.525 *S1, R3*					$8.40 *R3*	
	Pittsburgh, Pa. Midland, Pa. Butler, Pa.	4.675 *U1, J3,P6*	5.75 *U1, J3,P6*	6.30 *U1, J3*	6.325 *U1*		6.90 *U1, J3,R3*	8.525 *U1, J3*	9.275 *U1*		5.80 *A5, P6,J3*	$9.70 *J3, U1*	$8.40 *U1, J3*	7.15 *U1, J3*
	Portsmouth, Ohio	4.675 *P7*	5.75 *P7*								5.80 *P7*			
	Weirton, Wheeling, Follansbee, W. Va.	4.675 *W3, W5*	5.75 *W3, W5,F3*	6.30 *W3, W5*		6.70 *W3, W5*	6.90 *W3*	8.525 *W3*				$9.70 *W5*	$8.40 *W5*	7.15 *W5* 7.40 *W3*
	Youngstown, Ohio	4.675 *U1, Y1*	5.75 *Y1*		6.325 *Y1*		6.90 *Y1*	8.525 *Y1*			5.80 *Y1*			7.15 *Y1*
WEST	Fontana, Cal.	5.525 *K1*	7.00 *K1*				7.75 *K1*	9.775 *K1*				$10.45 *K1*	$9.15 *K1*	
	Geneva, Utah	4.775 *C7*												
	Kansas City, Mo.										6.05 *S2*			
	Los Angeles, Torrrance, Cal.										6.60 *B2*			
	Minnequa, Colo.										6.05 *C6*			
	San Francisco, Niles, Pittsburg, Cal.	5.375 *C7*	6.70 *C7*	7.05 *C7*							6.45 *C7*	$10.45 *C7*	$9.15 *C7*	
	Seattle, Wash.													
SOUTH	Atlanta, Ga.													
	Fairfield, Ala. Alabama City, Ala.	4.675 *T2, R3*	5.75 *T2,*	6.30 *T2, R3*							5.80 *T2,R3*	$9.80 *T2*	$8.50 *T2*	
	Houston, Tex.										6.05 *S2*			

IRON AGE

STEEL PRICES

(Effective Jan. 22, 1957)

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		BARS						PLATES				WIRE
		Carbon† Steel	Reinforcing	Cold Finished	Alloy Hot-rolled	Alloy Cold Drawn	Hi Str. H.R. Low Alloy	Carbon Steel	Floor Plate	Alloy	Hi Str. Low Alloy	Mfr'a. Bright
EAST	Bethlehem, Pa.				6.125 *B3*	8.325 *B3*	7.40 *B3*					
	Buffalo, N. Y.	5.075 *B3,R3*	5.075 *B3,R3*	6.90 *B5*	6.125 *B3,R3*	8.325 *B5,B3*	7.40 *B3*	4.85 *B3*				7.20 *W6*
	Claymont, Del.							5.70 *C4*		6.85 *C4*	7.55 *C4*	
	Coatesville, Pa.							5.25 *L4*		6.85 *L4*	7.55 *L4*	
	Conshohocken, Pa.							4.95 *A2*	5.025 *A2*	6.85 *A2*	7.25 *A2*	
	Harrisburg, Pa.							5.80 *P2*	6.275 *P2*			
	Hartford, Conn.			7.35 *R3*		8.625 *R3*	7.40 *B3*					
	Johnstown, Pa.	5.075 *B3*	5.075 *B3*		6.125 *B3*			4.85 *B3*		6.85 *B3*	7.25 *B3*	7.20 *B3*
	Fairless, Pa.	5.225 *U1*	5.225 *U1*		6.275 *U1*							
	Newark, N. J.			7.30 *W10*		8.50 *W10*						
	Camden, N. J.			7.30 *P10*		8.50 *P10*						
	Bridgeport, Conn. Putnam, Conn.	5.30 *N8*	5.30 *N8*	7.20 *N8* 7.40 *W10*	6.20 *N8*	8.475 *N8*	7.50 *N8*					
	Sparrows Pt., Md.		5.075 *B3*					4.85 *B3*		6.85 *B3*	6.85 *B3*	7.30 *B3*
	Palmer, Worcester, Readville, Mass. Milton, Pa.	5.225 *M7*	5.225 *M7*	7.40 *B5,C14*		8.325 *A5* 8.625 *B5*						7.50 *A5,W6* 9.025 *T8*
	Spring City, Pa.			7.30 *K4*		8.50 *K4*						
MIDDLE WEST	Alton, Ill.	5.275 *L1*										7.40 *L1*
	Ashland, Newport, Ky							4.85 *A7,A9*		6.85 *A9*		
	Canton, Massillon, Ohio			6.85 *R3,R2*	6.125 *R3,T5*	8.325 *R3,R2, T5*						
	Chicago, Joliet, Ill.	5.075 *U1,R3, W8,N4* 5.575 *P13*	5.075 *U1,R3, N4* 5.575 *P13*	6.85 *A5,B5, W10,L2 W8,N9*	6.125 *U1,R3, W8*	8.325 *A5,B5, W8,L2,N9, W10*	5.875 *W8*	4.85 *U1,I3, W8,A1*	5.925 *U1*	6.85 *U1,W8*	7.25 *U1*	7.20 *A5,K2 R3,N4,W7*
	Cleveland, Ohio	5.075 *R3*	5.075 *R3*	6.85 *A5,C13*		8.325 *A5,C13*	7.425 *R3*	4.95 *J3,R3*	5.925 *J3*		7.25 *J3,R3*	7.20 *A5, C13*
	Detroit, Mich.	5.175 *G3*	5.425 *G3*	7.05 *B5,P8* 7.10 *P3* 6.85 *R5*	6.225 *G3* 6.125 *R5*	8.525 *B5,P3, P8* 8.325 *R5*	7.525 *G3*	4.95 *G3*		6.90 *G3*		
	Duluth, Minn.											7.20 *A5*
	Gary, Ind. Harbor, Crawfordsville	5.075 *U1,I3, Y1*	5.075 *U1,I3, Y1*	6.85 *R3,M5*	6.125 *U1,I3, Y1*	8.325 *R3,M4*	7.425 *U1,I3, Y1*	4.85 *U1,I3, Y1*	5.925 *I3*	6.85 *U1,Y1*	7.25 *U1,Y1*	7.30 *M4*
	Granite City, Ill.							5.05 *G2*				
	Kokomo, Ind.											7.30 *C9*
	Sterling, Ill.	5.525 *N4*	5.175 *N4*									7.30 *K2*
	Niles, Warren, Ohio Sharon, Pa.			6.85 *C10*	6.125 *C10,S1*	8.325 *C10*	7.425 *S1*	4.85 *S1,R3*		6.85 *S1*	7.25 *S1,R3*	
	Pittsburgh, Pa. Midland, Pa.	5.075 *U1, C11,J3*	5.075 *U1,J3*	6.85 *A5,C8, J3,R3,S9, B4,W10,C11*	6.125 *U1, C11,J3*	8.325 *A5,R3, S9,C8,W10, C11*	7.425 *U1,J3*	4.85 *U1,J3*	5.925 *U1*	6.85 *U1,J3*	7.25 *U1,J3*	7.20 *A5,J3, P6*
	Portsmouth, Ohio											7.20 *P7*
	Weirton, Wheeling, Follansbee, W. Va.							4.85 *W5*				
	Youngstown, Ohio	5.075 *U1, Y1,R3*	5.075 *U1, Y1,R3*	6.85 *U1,Y1, F2*	6.125 *U1,Y1*	8.325 *Y1,F2*	7.425 *U1,Y1,*	4.85 *U1,Y1, R3*		6.85 *Y1*	7.25 *Y1*	7.20 *Y1*
WEST	Emeryville, Cal.	5.825 *J5*	5.825 *J5*									
	Fontana, Cal.	6.025 *K1*	6.025 *K1*		7.175 *K1*		8.125 *K1*	5.60 *K1*		7.60 *K1*	8.00 *K1*	
	Geneva, Utah	5.175 *C7*						4.85 *C7*			7.25 *C7*	
	Kansas City, Mo.	5.325 *S2*	5.325 *S2*		6.375 *S2*		7.675 *S2*					7.45 *S2*
	Los Angeles, Torrance, Cal.	5.775 *C7,B2*	5.775 *C7,B2*	8.30 *R3,P14*	7.175 *B2*	10.10 *P14*	8.125 *B2*					8.15 *B2*
	Minnequa, Colo.	5.525 *C6*	5.525 *C6*					5.70 *C6*				7.45 *C6*
	Portland, Ore.	5.825 *O2*	5.825 *O2*									
	San Francisco, Niles, Pittsburg, Cal.	5.775 *C7* 5.825 *B2* 6.025 *P9*	5.775 *C7* 5.825 *B2* 6.025 *P9*				8.175 *B2*					8.15 *C7,C6*
	Seattle Wash.	5.825 *B2 N6*	5.825 *B2*				8.175 *B2*	5.75 *B2*		7.75 *B2*	8.15 *B2*	
SOUTH	Atlanta, Ga.	5.575 *A8*										7.40 *A8*
	Fairfield, Ala. City, Birmingham, Ala.	5.075 *T2,R3* 5.375 *C16*	5.075 *T2,R3* 5.375 *C16*				7.425 *T2*	4.85 *T2,R3*			7.25 *T2*	7.20 *T2,R3*
	Houston, Ft. Worth, Lone Star, Tex.	5.325 *S2*	5.325 *S2*		6.375 *S2*		7.675 *S2*	4.95 *S2* 5.20 *L3*		6.95 *S2*	7.35 *S2*	7.45 *S2*

† Merchant Quality—Specialty Quality .35¢ higher.

Steel Prices *(Effective Jan. 22, 1957)*

Key to Steel Producers

With Principal Offices

A1 Acme Steel Co., Chicago
A2 Alan Wood Steel Co., Conshohocken, Pa.
A3 Allegheny Ludlum Steel Corp., Pittsburgh
A4 American Cladmetals Co., Carnegie, Pa.
A5 American Steel & Wire Div., Cleveland
A6 Angel Nail & Chaplet Co., Cleveland
A7 Armco Steel Corp., Middletown, Ohio
A8 Atlantic Steel Co., Atlanta, Ga.
A9 Acme-Newport Steel Co., Newport, Ky.

B1 Babcock & Wilcox Tube Div., Beaver Falls, Pa.
B2 Bethlehem Pacific Coast Steel Corp., San Francisco
B3 Bethlehem Steel Co., Bethlehem, Pa.
B4 Blair Strip Steel Co., New Castle, Pa.
B5 Bliss & Laughlin, Inc., Harvey, Ill.
B6 Brook Plant, Wickwire Spencer Steel Div., Birdsboro, Pa.

C1 Calstrip Steel Corp., Los Angeles
C2 Carpenter Steel Co., Reading, Pa.
C3 Central Iron & Steel Co., Harrisburg, Pa.
C4 Claymont Products Dept., Claymont, Del.
C5 Cold Metals Products Co., Youngstown, O.
C6 Colorado Fuel & Iron Corp., Denver
C7 Columbia Geneva Steel Div., San Francisco
C8 Columbia Steel & Shafting Co., Pittsburgh
C9 Continental Steel Corp., Kokomo, Ind.
C10 Copperweld Steel Co., Pittsburgh, Pa.
C11 Crucible Steel Co. of America, Pittsburgh
C12 Cumberland Steel Co., Cumberland, Md.
C13 Cuyahoga Steel & Wire Co., Cleveland
C14 Compressed Steel Shafting Co., Readville, Mass.
C15 G. O. Carlson, Inc., Thorndale, Pa.
C16 Connors Steel Div , Birmingham
C17 Chester Blast Furnace, Inc., Chester, Pa.

D1 Detroit Steel Corp., Detroit
D2 Dearborn Div., Sharon Steel Corp.
D3 Driver Harris Co., Harrison, N. J.
D4 Dickson Weatherproof Nail Co., Evanston, Ill.
D5 Henry Disston Div., Philadelphia

E1 Eastern Stainless Steel Corp., Baltimore
E2 Empire Steel Co., Mansfield, O.

F1 Firth Sterling, Inc., McKeesport, Pa.
F2 Fitzsimons Steel Corp., Youngstown
F3 Follansbee Steel Corp., Follansbee, W. Va.
G2 Granite City Steel Co., Granite City, Ill.
G3 Great Lakes Steel Corp., Detroit
G4 Greer Steel Co., Dover, O.

H1 Hanna Furnace Corp., Detroit

I2 Ingersoll Steel Div., Chicago
I3 Inland Steel Co., Chicago
I4 Interlake Iron Corp., Cleveland

J1 Jackson Iron & Steel Co., Jackson, O.
J2 Jessop Steel Corp., Washington, Pa.
J3 Jones & Laughlin Steel Corp., Pittsburgh
J4 Joslyn Mfg. & Supply Co., Chicago
J5 Judson Steel Corp., Emeryville, Calif.

K1 Kaiser Steel Corp., Fontana, Cal.
K2 Keystone Steel & Wire Co., Peoria
K3 Koppers Co., Granite City, Ill.
K4 Keystone Drawn Steel Co., Spring City, Pa.

L1 Laclede Steel Co., St. Louis
L2 La Salle Steel Co., Chicago
L3 Lone Star Steel Co., Dallas
L4 Lukens Steel Co., Coatesville, Pa.

M1 Mahoning Valley Steel Co., Niles, O.
M2 McLouth Steel Corp., Detroit
M3 Mercer Tube & Mfg. Co., Sharon, Pa.
M4 Mid-States Steel & Wire Co., Crawfordsville, Ind.
M5 Monarch Steel Div., Hammond, Ind.
M6 Mystic Iron Works, Everett, Mass.
M7 Milton Steel Products Div., Milton, Pa.

N1 National Supply Co., Pittsburgh
N2 National Tube Div., Pittsburgh
N3 Niles Rolling Mill Div., Niles, O.
N4 Northwestern Steel & Wire Co., Sterling, Ill.
N6 Northwest Steel Rolling Mills, Seattle
N7 Newman Crosby Steel Co., Pawtucket, R. I.
N8 Northeastern Steel Corp., Bridgeport, Conn.
N9 Nelson Steel & Wire Co.

O1 Oliver Iron & Steel Co., Pittsburgh
O2 Oregon Steel Mills, Portland

P1 Page Steel & Wire Div., Monessen, Pa.
P2 Phoenix Iron & Steel Co., Phoenixville, Pa.
P3 Pilgrim Drawn Steel Div., Plymouth, Mich.
P4 Pittsburgh Coke & Chemical Co., Pittsburgh
P5 Pittsburgh Screw & Bolt Co., Pittsburgh
P6 Pittsburgh Steel Co., Pittsburgh
P7 Portsmouth Div., Detroit Steel Corp., Detroit
P8 Plymouth Steel Co., Detroit
P9 Pacific States Steel Co., Niles, Ca..
P10 Precision Drawn Steel Co., Camden, . J.
P11 Production Steel Strip Corp., Detroit
P13 Phoenix Mfg. Co., Joliet, Ill.
P14 Pacific Tube Co.

R1 Reeves Steel & Mfg. Co., Dover, O.
R2 Reliance Div., Eaton Mfg. Co., Massillon, O.
R3 Republic Steel Corp., Cleveland
R4 Roebling Sons Co., John A., Trenton, N. J.
R5 Rotary Electric Steel Co., Detroit
R6 Rodney Metals, Inc., New Bedford, Mass.
R7 Rome Strip Stee Co., Rome, N. Y

S1 Sharon Steel Corp., Sharon, Pa.
S2 Sheffield Steel Div., Kansas City
S3 Shenango Furnace Co., Pittsburgh
S4 Simonds Saw and Steel Co., Fitchburg, Mass.
S5 Sweet's Steel Co., Williamsport, Pa.
S6 Standard Forging Corp., Chicago
S7 Stanley Works, New Britain, Conn.
S8 Superior Drawn Steel Co., Monaca, Pa.
S9 Superior Steel Corp., Carnegie, Pa.
S10 Seneca Steel Service, Buffalo

T1 Tonawanda Iron Div., N. Tonawanda, N. Y.
T2 Tennessee Coal & Iron Div., Fairfield
T3 Tennessee Products & Chem. Corp., Nashville
T4 Thomas Strip Div., Warren, O.
T5 Timken Steel & Tube Div., Canton, O.
T7 Texas Steel Co., Fort Worth
T8 Thompson Wire Co., Boston

U1 United States Steel Corp., Pittsburgh
U2 Universal-Cyclops Steel Corp., Bridgeville, Pa.
U3 Ulbrich Stainless Steels, Wallingford, Conn.
U4 U. S. Pipe & Foundry Co., Birmingham

W1 Wallingford Steel Co., Wallingford, Conn.
W2 Washington Steel Corp., Washington, Pa.
W3 Weirton Steel Co., Weirton, W. Va.
W4 Wheatland Tube Co., Wheatland, Pa.
W5 Wheeling Steel Corp., Wheeling, W. Va.
W6 Wickwire Spencer Steel Div., Buffalo
W7 Wilson Steel & W re Co., Chicago
W8 Wisconsin Steel Div., S. Chicago, Ill.
W9 Woodward Iron Co., Woodward, Ala.
W10 Wycoff Steel Co., Pittsburgh
W12 Wallace Barnes Steel Div., Bristol, Conn.

Y1 Youngstown Sheet & Tube Co., Youngstown, O.

PIPE AND TUBING — **Base discounts (pct) f.o.b. mills. Base price about $200 per net ton.**

	BUTTWELD														SEAMLESS							
	½ In.		¾ In.		1 In.		1¼ In.		1½ In.		2 In.		2½-3 In.		2 In.		2½ In.		3 In.		3½-4 In.	
STANDARD T. & C.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Ga.	Blk.	Ga.	Blk	Gal.	Blk.	Gal.	Blk.	Gal.
Sparrows Pt *B3*	10.50	+4.75	13.50	+0.75	16.00	2.75	18.50	3.50	19.00	4.50	19.50	5.00	21.00	4.75								
Youngstown *R3*	12.50	+2.75	15.50	1.25	18.00	4.75	20.50	5.50	21.00	6.50	21.50	7.00	23.00	6.75								
Fontana *K1*	+0.50	+19.75	2.50	+15.75	5.00	+12⅝	7.50	+10.5	8.00	+9.50	8.50	+9.00	10.00	+8.25								
Pittsburgh *J3*	12.50	+2.75	15.50	1.25	18.00	4.75	20.50	5.50	21.00	6.50	21.50	7.00	23.00	6.75	+2.00	+17	4.50	+12.25	7.00	+9.75	8.50	+8.25
Alton, Ill. *L1*	10.50	+4.75	13.50	+0.75	16.00	2.75	18.50	3.50	19.00	4.50	19.50	5.00	21.00	4.75								
Sharon *M3*	12.50	+2.75	15.50	1.25	18.00	4.75	20.50	5.50	21.00	6.50	21.50	7.00	23.00	6.75								
Fairless *N2*	10.50	+4.75	13.50	+0.75	16.00	2.75	18.50	3.50	19.00	4.50	19.50	5.00	21.00	4.75								
Pittsburgh *N1*	12.50	+2.75	15.50	1.25	18.00	4.75	20.50	5.50	21.00	6.50	21.50	7.00	23.00	6.75	+2.00	+17	4.50	+12.25	7.00	+9.75	8.50	+8.25
Wheeling *W5*	12.50	+2.75	15.50	1.25	18.00	4.75	20.50	5.50	21.00	6.50	21.50	7.00	23.00	6.75								
Wheatland *W4*	12.50	+2.75	15.50	1.25	18.00	4.75	20.50	5.50	21.00	6.50	21.50	7.00	23.00	6.75								
Youngstown *Y1*	12.50	+2.75	15.50	1.25	18.00	4.75	20.50	5.50	21.00	6.50	21.50	7.00	23.00	6.75	+2.0	+17	4.50	+12.25	7.00	+9.75	8.50	+8.25
Indiana Harbor *Y1*	11.50	+5.75	14.50	1.25	17.00	3.75	19.50	4.50	20.00	5.50	20.50	6.00	22.00	5.75								
Lorain *N2*	12.50	+2.75	15.50	1.25	18.00	4.75	20.50	5.50	21.00	6.50	21.50	7.00	23.00	6.75	+2.00	+17	4.50	+12.25	7.00	+9.75	8.50	+8.25
EXTRA STRONG PLAIN ENDS																						
Sparrows Pt. *B3*	15.00	1.25	19.00	5.25	21.00	8.75	21.50	7.50	22.00	8.50	22.50	9.00	23.00	7.75								
Youngstown *R3*	17.00	3.25	21.00	7.25	23.00	10.75	23.50	9.75	24.00	10.50	24.50	11.00	25.00	9.75								
Fairless *N2*	15.00	1.25	19.00	5.25	21.00	8.75	21.50	7.50	22.00	8.50	22.50	9.00	23.00	7.75								
Fontana *K1*	4.00		8.00		10.00		10.50		11.00		11.50		12.00									
Pittsburgh *J3*	17.00	3.25	21.00	7.25	23.00	10.75	23.50	9.75	24.00	10.50	24.50	11.00	25.00	9.75	+0.50	+14.50	7.00	+8.75	9.50	+6.25	14.50	+1.25
Alton, Ill. *L1*	15.00	1.25	19.00	5.25	21.00	8.75	21.50	7.50	22.00	8.50	22.50	9.00	23.00	7.75								
Sharon *M3*	17.00	3.25	21.00	7.25	23.00	10.75	23.50	9.75	24.00	10.50	24.50	11.00	25.00	9.75								
Pittsburgh *N1*	17.00	3.25	21.00	7.25	23.00	10.75	23.50	9.75	24.00	10.50	24.50	11.00	25.00	8.75	+0.50	+14.50	7.00	+8.75	9.50	+6.25	14.50	+1.25
Wheeling *W5*	17.00	3.25	21.00	7.25	23.00	10.75	23.50	9.75	24.00	10.50	24.50	11.00	25.00	8.75								
Wheatland *W4*	17.00	3.25	21.00	7.25	23.00	10.75	23.50	9.75	24.00	10.50	24.50	11.00	25.00	8.75								
Youngstown *Y1*	17.00	3.25	21.00	7.25	23.00	10.75	23.50	9.75	24.00	10.50	24.50	11.00	25.00	8.75	+0.50	+14.50	7.00	+8.75	9.50	+6.25	14.50	+1.25
Indiana Harbor *Y1*	16.00	2.25	20.00	6.25	22.00	9.75	22.50	8.50	23.00	9.50	23.50	10.00	22.00	8.75								
Lorain *N2*	17.00	3.25	21.00	7.25	23.00	10.75	23.50	9.75	24.00	10.50	24.50	11.00	25.00	9.75	+0.50	+14.50	7.00	+8.75	9.50	+6.25	14.50	+1.25

b-g Threads only, buttweld and seamless 2¼ pt. higher discount. Plain ends, buttweld and seamless, 3-in. and under, 5½ pt. higher discount.
Galvanized discounts based on zinc price range of over 9¢ to 11¢ per lb. East St. Louis. For each 2¢ change in zinc, discounts vary as follows: ½, ¾ and 1-in , 2 pt.; 1¼, 1½ and 2-in., 1½ pt.; 2½ and 3-in., 1 pt., e.g., zinc price range of over 13¢ to 15¢ would lower discounts on 2½ and 3-in. pipe by 2 points; zinc price in range over 7¢ to 9¢ would increase discounts. East St. Louis zinc price now 13.50¢ per lb

TOOL STEEL

F.o.b. mill

W	Cr	V	Mo	Co	per lb	SAE
18	4	1	—	—	$1.68	T-1
18	4	1	—	5	2.385	T-4
18	4	2	—	—	1.185	T-2
1.5	4	1.5	8	—	1.04	M-1
6	4	3	6	—	1.43	M-3
6	4	2	5	—	1.185	M-2

High-carbon chromium	.83 D-3, D-5
Oil hardened manganese	.45 O-2
Special carbon	.41 W-1
Extra carbon	.345 W-1
Regular carbon	.29 W-1

Warehouse prices on and east of Mississippi are 4¢ per lb higher. West of Mississippi, 6¢ higher.

CLAD STEEL

Base prices, cents per lb f.o.b.

	Cladding	Plate (*A3, J2, L4*) 10 pct	Plate (*A3, J2, L4*) 15 pct	Plate (*A3, J2, L4*) 20 pct	Sheet (*I2*) 20 pct
Stainless Type	302	.....	.....	.....	33.25
	304	34.60	38.00	41.50	35.25
	316	39.70	43.20	46.65	52.25
	321	36.35	39.80	43.50	42.00
	347	39.50	43.95	48.45	51.00
	405	29.20	33.15	37.05	.....
	410, 430	28.70	32.65	36.55	.....

CR Strip (S8) Copper, 10 pct, 2 sides, 40.85; 1 side, 33.50.

ELECTRICAL SHEETS

22-Gage F.o.b. Mill Cents Per Lb	Hot-Rolled (Cut Lengths)*	Cold-Reduced (Coiled or Cut Length) Semi-Processed	Cold-Reduced (Coiled or Cut Length) Fully Processed
Field	9.00	9.20	....
Armature	10.35	10.35	10.85
Elect.	11.00	11.025	11.525
Meter	12.05	12.075	12.575
Dynamo	13.05	13.05	13.55
Trans. 72	14.05	14.05	14.55
Trans. 65	14.60	Grain Oriented	
Trans. 58	15.10	Trans. 80	18.50
Trans. 52	16.15	Trans. 73	19.00

Producing points: Beech Bottom (*W5*); Brackenridge (*A3*); Granite City (*G2*); Indiana Harbor (*I3*) Mansfield (*E2*); Newport, Ky. (*N5*); Niles, O. (*N3*); Vandergrift (*U1*); Warren, O. (*R3*) (20¢ higher, HR); Zanesville, Butler (*A7*).

LAKE SUPERIOR ORES

51.50% Fe natural content, delivered lower Lake ports. Prices for 1956 season. Freight changes for seller's account.

	Gross Ton
Openhearth lump	$12.10
Old range, bessemer	11.25
Old range, nonbessemer	11.10
Mesabi, bessemer	11.00
Mesabi, nonbessemer	10.85
High phosphorus	10.85

MERCHANT WIRE PRODUCTS

F.o.b. Mill	Standard Q Coated Nails Cal	Woven Wire Fence Cal	"T" Fence Posts Cal	Galv. Barbed and Twisted Barbless Wire Cal	Merch. Wire Annld ¢/lb.	Merch. Wire Galv. ¢/lb.
Alabama City *R3*	167	181	195	187	8.10	8.50
Aliquippa, Pa. *J3****	164	179		181	7.95	8.475
Atlanta *A8***	166	182	192	190	8.05	8.65
Bartonville *K2***	166	182	192	190	8.05	8.65
Buffalo *W6*					8.10	8.50
Chicago, Ill. *N4***	164	180	167	190	188	7.95	8.55
Cleveland *A6*	173				8.10	
Cleveland *A5*					7.95	
Crawfordsville *M4***	166	182	192	190	8.05	8.65
Donora, Pa. *A5*	164	176	190	184	7.95	8.35
Duluth *A5*	164	176	190	184	7.95	8.35
Fairfield, Ala. *T2*	164	176	190	184	7.95	8.35
Galveston *D4*	169‡					
Houston *S2*	169	181	195	189	8.20	8.60
Johnstown, Pa. *B3***	164	180	167	188	7.95	8.55
Joliet, Ill. *A5*	164	176	190	184	7.95	8.35
Kokomo, Ind. *C9**	166	178	192	186	8.05	8.45
Los Angeles *B2***					8.90	9.50
Kansas City *S2**	169	181	195	189	8.20	8.60
Minnequa *C6*†	169	181	172	195	189	8.20	8.60
Monessen *P6*	167	185		191	8.10	8.10
Pittsburg, Cal. *C7*	186	199		204	8.90	9.30
Portsmouth *P7*					7.95	
Rankin, Pa. *A5*	164	176		184	7.95	8.35
So. Chicago *R3*	167	181	195	187	8.10	8.50
S. San Francisco *C6*			214		8.90	9.30
Sparrows Pt. *B3***	166		192	190	8.05	8.65
Struthers, O. *Y1**					7.95	8.45
Worcester *A5*	170				8.25	8.65
Williamsport, Pa. *S5*		175				

* Zinc less than .10¢. † Plus zinc extras.
** 13.5 zinc. ‡ Wholesalers only
*** .10¢ zinc.

C-R SPRING STEEL

Cents Per Lb F.o.b. Mill	CARBON CONTENT 0.26–0.40	0.41–0.60	0.61–0.80	0.81–1.05	1.06–1.35
Baltimore, Md. *T8*	8.25	10.10	12.30	15.30	18.25
Bristol, Conn. *W12*			12.30	15.30	18.25
Boston *T8*	8.50	10.10	12.30	15.30	18.25
Buffalo, N. Y. *R7*	7.95	9.80	12.60	15.00	17.95
Carnegie, Pa. *S9*	‡	9.80	12.00	15.00	
Cleveland *A5*	7.95	9.80	12.00	15.00	17.95
Detroit *D1*	8.05	9.90	12.10	15.10	
Detroit *D2*	8.05	9.90	12.10		
Dover, O. *G4*	7.95	9.80	12.00	15.00	17.95
Franklin Park, Ill. *T8*	8.05	9.80	12.60	15.00	17.95
Harrison, N. J. *C11*			12.30	15.30	18.25
Indianapolis *C5*	8.10	9.95	12.60	15.00	17.95
New Castle, Pa. *B4*	7.95	9.80	12.60	15.00	
New Haven, Conn. *D1*	8.40	10.10	12.30	15.30	
Pawtucket, R. I. *N7*	8.50	10.10	12.30	15.30	18.25
Pittsburgh *S7*	7.95	9.80	12.60	15.00	17.95
Riverdale, Ill. *A1*	8.05	9.80	12.00	15.00	17.95
Sharon, Pa. *S1*	7.95	9.80	12.60	15.00	17.95
Trenton *R4*		10.10	12.90	15.30	18.25
Wallingford *W1*	8.40	10.10	12.30	15.30	18.15
Warren, Ohio *T4*	7.95	9.80	12.60	15.00	17.95
Wairton, W. Va. *W3*	7.95	9.80	12.60	15.00	17.95
Worcester, Mass. *A5*	8.50	10.10	12.30	15.30	18.25
Youngstown *C5*	7.95	9.80	12.60	15.00	17.95

‡ On Application.

BOILER TUBES

$ per 100 ft. carload lots, cut 10 to 24 ft. F.o.b. Mill	Size OD-In.	Size B.W. Ga.	Seamless H.R.	Seamless C.D.	Elec. Weld H.R.	Elec. Weld C.D.
Babcock & Wilcox	2	13	34.88	40.85	33.21	.....
	2½	12	46.98	55.01	44.73	.....
	3	12	54.24	63.53	51.66	.....
	3½	11	63.32	74.16	60.30	.....
	4	10	84.09	98.47	80.07	.....
National Tube	2	13	34.88	40.85	33.21	.....
	2½	12	46.98	55.01	33.73	.....
	3	12	54.24	63.53	51.66	.....
	3½	11	63.32	74.16	60.30	.....
	4	10	84.09	98.47	80.07	.....
Pittsburgh Steel	2	13	34.88	40.85	.....	.....
	2½	12	46.98	55.01	.....	.....
	3	12	54.24	63.53	.....	.....
	3½	11	63.32	74.16	.....	.....
	4	10	84.09	98.47	.....	.....

WAREHOUSES

Metropolitan Price, dollars per 100 lb.

Cities	City Delivery‡ Charge	Sheets: Hot-Rolled (18 ga. & hvr.)	Sheets: Cold-Rolled (15 gage)	Sheets: Galvanized (10 gage)††	Strip: Hot-Rolled	Plates	Shapes: Standard Structural	Bars: Hot-Rolled (merchant)	Bars: Hot-Rolled (special quality)	Bars: Cold-Finished	Alloy Bars: Hot-Rolled 4615 As rolled	Alloy Bars: Hot-Rolled 4140 Annealed	Alloy Bars: Cold-Drawn 4615 As rolled	Alloy Bars: Cold-Drawn 4140 Annealed
Atlanta		8.07	9.27	9.83	8.16	8.40	8.44	8.30	.....	10.14	.....	.....	.....	.....
Baltimore	$.10	7.79	8.99	9.12	8.27	8.12	8.57	8.34	.....	9.09	14.99	14.44	18.39	18.09
Birmingham	.15	7.68	8.88	8.85	7.78	8.01	8.85	7.91	.....	10.04	.....	.....	.....	.....
Boston	.10	8.80–8.94	9.83–9.98	11.12	8.89–8.99	9.08–9.28	9.00–9.20	8.88–8.98	9.53	10.71–10.81	15.05	14.59	18.51	18.24
Buffalo	.15	8.00	9.15	11.86	8.20	8.65	8.65	8.15	8.85	8.85	15.00	14.45	18.40	18.10
Chicago	.15	7.70–7.95	9.05–9.15	9.85	7.78–7.97	8.31	8.35	8.06	8.59	8.35–8.50	14.65	14.10	18.05	17.75
Cincinnati	.15	8.09	9.20	9.90	8.29	8.67	8.89	8.34	8.87	8.97	14.93	14.38	18.33	18.03
Cleveland	.15	7.93	9.13	9.75	8.07	8.54	8.72	8.14	8.67	8.75	14.73	14.18	18.13	17.83
Denver		9.55	11.09	12.41	9.70	9.80	9.60	9.75	.....	10.54	.....	.....	.....	19.79
Detroit	.15	8.18	9.40	11.70	8.32	8.66	8.89	8.33	8.86	8.83	.....	14.36	.....	18.01
Houston		8.70	9.65	.....	8.80	8.60	8.90	8.95	.....	10.55	15.50	.....	19.30	19.05
Kansas City	.20	8.52	9.72	10.07	8.60	8.83	8.87	8.73	.....	9.42	15.32	14.77	18.72	18.42
Los Angeles	.10	9.00	10.75	11.75	9.20	9.45	9.05	8.90	9.60	11.80	15.85	15.35	19.70	19.45
Memphis	.15	8.02	9.22	.....	8.12	8.35	8.39	8.25	.....	9.85	.....	.....	.....	.....
Milwaukee	.15	8.08	9.28	9.97	8.10	8.44	8.56	8.18	8.71	8.72	14.77	14.22	18.17	17.87
New York	.10	8.55	9.76	10.33	9.00	9.11	9.01	8.93	9.48	10.71	15.02	14.49	18.42	18.14
Norfolk	.20	8.00	.....	.....	8.40	8.35	8.70	8.45	.....	10.70	.....	.....	.....	.....
Philadelphia	.10	8.25	9.17	9.66–10.22	8.68–8.92	8.38–8.78	8.48–8.80	8.47–8.65	9.18	9.22–9.41	14.80	14.25–14.41	18.20	18.06
Pittsburgh	.15	7.93	8.88–9.14	10.20	7.88–8.07	8.31	8.35	8.06**	8.59	8.75	14.65	14.10	18.05	17.75
Portland		8.90	9.65	11.40	9.05	8.70	8.90	8.95	.....	13.55	16.70	16.10	20.40	20.25
San Francisco	.10	8.85	10.40	10.90	9.05	8.95	8.95	8.90	9.45	12.40	15.85	15.35	19.70	19.45
Seattle		9.35	10.45	11.55	9.50	9.05	9.15	9.30	9.85	13.15	16.10	15.55	19.50	19.20
St. Louis	.15	8.29–8.54	9.49–9.74†	10.03–10.18	8.11–8.34	8.34–8.67	8.82	8.25–8.40	8.93	8.93–9.08	14.83–14.98	14.43	18.23–18.38	18.08
St. Paul	.15	8.29	9.64	10.31	8.39	8.71	8.75	8.52	.....	9.21	.....	14.62	.....	18.27

Base Quantities (Standard unless otherwise keyed): Cold finished bars: 2000 lb or over. Alloy bars: 1000 to 1999 lb. All others: 2000 to 4999 lb. All HR products may be combined for quantity. All galvanized sheets may be combined for quantity. CR sheets may not be combined with each other or with galvanized sheets for quantity.
**F.O.B. Plant, warehouse price. †16 gage. ††13½¢ zinc. ‡Deduct for country del'ry.

(Effective Jan. 22, 1957)

RAILS, TRACK SUPPLIES

F.o.b. Mill Cents Per Lb	No. 1 Std. Rails	Light Rails	Joint Bars	Track Spikes	Screw Spikes	Tie Plates	Track Bolts Untreated
Bessemer *U1*	5.075	6.00	6.35				
So. Chicago *R3*				8.775			
Ensley *T2*	5.075	6.00					
Fairfield *T2*		6.00		8.775		6.025	
Gary *U1*	5.075	6.00				6.025	
Ind. Harbor *I3*	5.075		6.35	8.775		6.025	
Ind. Harbor *Y1*				8.775			
Johnstown *B3*		6.00					
Joliet *U1*	5.075		6.35				
Kansas City *S2*				8.775			
Lackawanna *B3*	5.075	6.00	6.35			6.025	
Lebanon *B3*							13.10
Minnequa *C6*	5.075	6.50	6.35	8.775		6.025	13.10
Pittsburgh *P5*				8.775	12.85		
Pittsburgh *J3*				8.775			13.10
Seattle *B2*				9.275		6.175	13.16
Steelton *B3*	5.075		6.35			6.025	13.10
Struthers *Y1*				8.775			
Torrence *C7*							
Williamsport *S5*		6.15					
Youngstown *R3*				8.775			

COKE

Furnace, beehive (f.o.b. oven) Net-Ton
Connellsville, Pa. .....$15.00 to $15.75
Foundry, beehive (f.o.b. oven)
$17.50 to $19.00

Foundry oven coke
Buffalo, del'd $30.75
Detroit, f.o.b. 29.50
New England, del'd 30.55
Seaboard, N. J., f.o.b. 29.75
Philadelphia, f.o.b. 29.50
Swedesland, Pa., f.o.b. 29.50
Painesville, Ohio, f.o.b. 29.50
Erie, Pa., f.o.b. 29.50
Cleveland, del'd 31.55
Cincinnati, del'd 28.59
St. Paul, f.o.b. 28.50
St. Louis, f.o.b. 30.50
Birmingham, f.o.b. 27.60
Milwaukee, f.o.b. 29.50
Lone Star, f.o.b. 25.50

ELECTRODES

Cents per lb f.o.b. plant, threaded, with nipples, unbored.

GRAPHITE			CARBON*		
Diam. (In.)	Length (In.)	Price	Diam. (In.)	Length (In.)	Price
24	84	24.75	40	100,110	10.70
20	72	24.00	35	110	10.70
16 to 18	72	24.50	30	110	10.85
14	72	25.00	24	72 to 84	11.25
12	72	25.50	20	90	11.00
10	60	26.50	17	72	11.40
10	48	27.00	14	72	11.85
7	60	26.75	12	60	12.95
6	60	30.00	10	60	13.00
4	40	33.25	8	60	13.30
3	40	35.25			
2½	30	37.25			
2	24	57.75			

*Prices shown cover carbon nipples.

ELECTROPLATING SUPPLIES

Anodes

(Cents per lb, frt allowed in quantity)

Copper
Cast elliptical, 18 in. or longer, 5000 lb lots 53.42
Electrodeposited 43.28
Brass, 80-20, ball anodes, 2000 lb or more 54.00
Zinc, ball anodes, 2000 lb lots 21.25
(for elliptical add 2c per lb)
Nickel, 99 pct plus, rolled carbon $1.0225
(rolled depolarized add 3c per lb)
Cadmium $1.70
Tin, ball anodes and elliptical $1.07 per in.

Chemicals

(Cents per lb, f.o.b. shipping point)

Copper cyanide, 100 lb drum 77.50
Copper sulphate, 5 or more 100 lb bags, per cwt. 26.65
Nickel salts, single, 100 lb bags 49.50
Nickel chloride, freight allowed, 300 lb 45.50
Sodium cyanide, domestic, f.o.b. N. Y., 200 lb drums 23.05
(Philadelphia price 23.30)
Zinc cyanide, 100 to 900 lb 55.55
Potassium cyanide, 100 lb drum N. Y. 48.00
Chromic acid, flake type, 1 to 20 100-499 lb drums 31.75

BOLTS, NUTS, RIVETS, SCREWS

(Base discount, f.o.b. mill)
Pct Discounts

Machine and Carriage Bolts	Full Container Price	30 Containers	20,000 Lb.	40,000 Lb.
½" and smaller x 6" and shorter	55	58½	60½	61½
⅞" thru 1" x longer than 6"	46½	50	52½	54
Rolled thread carriage bolts ½ in. & smaller x 6 in. and shorter	55	58½	60½	61½
Lag, all diam. x 6" & shorter	55	58	60	61
Lag, all diam. longer than 6 in.	47	50	52	53
Plow bolts, ½" and smaller x 6" and shorter	54	57½	59	60

(Add 25 pct for broken case quantities)

Nuts, Hex, HP reg. & hvy.	Full Case or Keg Price
¾ in. or smaller	63
⅞ in. to 1 in. inclusive	59½
1⅛ in. to 1½ in. inclusive	64
1⅝ in. and larger	58
C.P. Hex regular & hvy.	
¾ in. and smaller	63
⅞ in. to 1½ in. inclusive	59½
1⅝ in. and larger	58
Hot Galv. Nuts (All Types)	
¾" and smaller	50
Semi-finished Hex Nuts	
¾ in. and smaller	63
⅞ in. to 1½ in. inclusive	59½
1⅝ in. and larger	58
(Add 25 pct for broken case or keg quantities)	
Finished	
1" and smaller	65

Rivets

Base per 100 lb
½ in. and larger $10.85
Pct Off List
7/16 in. and smaller 26½

Cap Screws

	Discount (Packages) Bright Treated	H. C. Heat
New std. hex head, packaged		
¼" diam. and smaller x 6" and shorter	47	54
⅜", ⅞" and 1" diam. x 6" and shorter	31	13
¼" diam. and smaller x longer than 6"	18½	+ 1
⅜", ⅞" and 1" diam. & longer than 6"	5½	+19½

	C-1018 Steel Full-Finished Cartons	Bulk
¼" through ⅝" dia. x 6" and shorter	47	63
¾" through 1" dia. x 6" and shorter	31	51½

Minimum quantity—¼" through ⅝" diam., 15,000 pieces; 1/16" through ⅝" diam., 5,000 pieces; ¾" through 1" diam., 2,000 pieces.

Machine Screws & Stove Bolts

	Quantity	Discount Mach. Screws	Stove Bolts
Plain Finish Cartons		19	32
Bulk			
To ¼" diam. incl.	25,000-200,000	9	54
5/16 to ½" diam. incl.	15,000-100,000	9	54
All diam. over 3" long	5,000-100,000	—	54

Machine Screw & Stove Bolt Nuts

	Quantity	Discount Hex	Square
In cartons		16	19
In Bulk			
⅜" diam. & smaller	15,000-100,000	7	9

CAST IRON WATER PIPE INDEX

Birmingham 119.0
New York 131.9
Chicago 133.4
San Francisco-L. A. 140.2
Dec. 1955 value, Class B or heavier 6 in. or larger, bell and spigot pipe. Explanation: p. 57, Sept. 1, 1955 issue. Source: U. S. Pipe and Foundry Co.

REFRACTORIES

Fire Clay Brick *Carloads per 1000*
First quality, Ill., Ky., Md., Mo., Ohio, Pa. (except Salina, Pa., add $5.00) $128.00
No. 1 Ohio 128.00
Sec. quality, Pa., Md., Ky., Mo., Ill. 114.00
No. 2 Ohio 98.00
Ground fire clay, net ton, bulk (except Salina, Pa., add $2.00) 20.00

Silica Brick

Mt. Union, Pa., Ensley, Ala. $140.00
Childs, Hays, Pa. 145.00
Chicago District 150.00
Western Utah 144.00-165.00
California 170.00
Super Duty
Hays, Pa., Athens, Tex., Windham, Warren, O., Morrisville 150.00-157.00
Silica cement, net ton, bulk, Latrobe 26.50
Silica cement, net ton, bulk, Chicago 24.00
Silica cement, net tons, bulk, Ensley, Ala. 25.50
Silica cement, net ton, bulk, Mt. Union 23.00
Silica cement, net ton, bulk, Utah and Calif. 35.00

Chrome Brick *Per net ton*
Standard chemically bonded, Balt.. $98.00
Standards chemically bonded, Curtiner, Calif. 108.00
Burned, Balt. 92.00

Magnesite Brick

Standard, Baltimore $121.00
Chemically bonded, Baltimore 109.00

Grain Magnesite St. ⅝ to ⅛-in. grains
Domestic, f.o.b. Baltimore in bulk $69.40
Domestic, f.o.b. Chewalah, Wash., Luning, Nev.
in bulk 43.00
in sacks 49.00

Dead Burned Dolomite *Per net ton*
F.o.b. bulk, producing points in:
Pa., W. Va., Ohio $16.00
Midwest 16.35
Missouri Valley 15.00

METAL POWDERS

Per pound, f.o.b. shipping point, in ton lots, for minus 100 mesh

Swedish sponge iron f.o.b. Riverton, N. J., ocean bags 8.50¢
Canadian sponge iron, Del'd in East, carloads ... 9.5¢
Domestic sponge iron, 98+% Fe, carloads lots ..... 8.5¢
Electrolytic iron, annealed, imported 99.5+% Fe ..... 27.5¢
domestic 99.5+% Fe ..... 36.5¢
Electrolytic iron, unannealed minus 325 mesh, 99+% Fe 57.0¢
Electrolytic Iron melting stock, 99.84% pure ..... 22.0¢
Carbonyl iron size 5 to 10 micron, 98%, 99.8+% Fe 86.0¢ to $1.55
Aluminum freight allowed.. 38.00¢
Brass, 10 ton lots .....37.50¢ to 50.00¢
Copper, electrolytic ..... 49.75¢
Copper, reduced ..... 49.75¢
Cadmium, 100-199 lb, 95¢ plus metal value
Chromium, electrolytic 99.85% min. Fe .03 max. Del'd ... $5.00
Lead .....8.90¢ plus metal value
Manganese ..... 70.0¢
Molybdenum, 99% .....$3.60 to $3.95
Nickel, unannealed $1.00
Nickel, annealed $1.06
Nickel, spherical, unannealed #80 ..... $1.13
Silicon ..... 43.50¢
Solder powder..7.0¢ to 9.0¢ plus met. value
Stainless steel, 302 ..... 99.0¢
Stainless steel, 316 ..... $1.32
Tin .....14.00¢ plus metal value
Tungsten, 99% (65 mesh) ... $4.20
Zinc, 10 ton lots .....18.75¢ to 32.50¢

Ferroalloy Prices

(Effective Jan. 22, 1957)

Ferrochrome

Contract prices, cents per lb contained Cr, lump, bulk, carloads, del'd. 67-71% Cr, .30-1.00% max. Si.

0.02% C	41.50	0.20% C	38.50
0.03% C	41.00	0.50% C	38.25
0.06% C	39.50	1.00% C	37.50
0.10% C	39.00	1.50% C	37.35
0.15% C	38.75	2.00% C	37.25

4.00-4.50% C, 67.70% Cr, 1-2% Si.. 27.75
3.50-5.00% C, 57-64% Cr, 2.00-4.50% Si 27.75
0.025% C (Simplex) 34.75
0.10% C, 50-52% Cr, 2% max Si .. 35.75
8.50% max. C, 50-55% Cr, 3-6% Si .. 24.00
8.50% C, 50-55% Cr, 3% max Si.... 24.00

High Nitrogen Ferrochrome

Low-carbon type 0.75% N. Add 5¢ per lb to regular low carbon ferrochrome max 0.10% C price schedule. Add 5¢ for each additional 0.25% of N.

Chromium Metal

Contract prices, per lb chromium contained, packed, delivered, ton lots, 97% min. Cr, 1% max. Fe.

0.10% max. C $1.31
0.50% max. C 1.31
9 to 11% C, 33-91% Cr, 0.75% Fe.. 1.40

Electrolytic Chromium Metal

Contract prices per lb of metal 2" x D plate (⅛" thick) delivered packed, 99.80% min. Cr. (Metallic Base) Fe 0.20 max.

Carloads $1.29
Ton lots 1.31
Less ton lots 1.33

Low Carbon Ferrochrome Silicon

(Cr 34-41%, Si 42-45%, C 0.05% max.)
Contract price, carloads, delivered, lump, 3-in. x down, per lb of Cr, packed.

Carloads 44.65
Ton lots 48.95
Less ton lots 51.45

Calcium-Silicon

Contract price per lb of alloy, lump, delivered, packed.
30-33% Cr, 60-65% Si, 3.00 max. Fe.

Carloads 25.65
Ton lots 27.95
Less ton lots 29.45

Calcium-Manganese—Silicon

Contract prices, cents per lb of alloy, lump, delivered, packed.
16-20% Ca, 14-18% Mn, 53-59% Si.

Carloads 24.25
Ton lots 26.15
Less ton lots 27.15

SMZ

Contract prices, cents per pound of alloy, delivered, 60-65% Si, 5-7% Mn, 5-7% Zr, 20% Fe ½ in. x 12 mesh.

Ton lots 20.15
Less ton lots 21.40

V Foundry Alloy

Cents per pound of alloy, f.o.b. Suspension Bridge, N. Y., freight allowed, max. St. Louis, V-5; 38-42% Cr, 17-19% Si, 8-11% Mn, packed.

Carload lots 17.30
Ton lots 18.70
Less ton lots 19.95

Graphidox No. 4

Cents per pound of alloy, f.o.b. Suspension Bridge, N. Y., freight allowed, max. St. Louis. Si 48 to 52%, Ti 9 to 11%, Ca 5 to 7%.

Carload packed 18.50
Ton lots to carload packed..... 19.65
Less ton lots 20.90

Ferromanganese

Maximum contract base price, f.o.b., lump size, base content 74 to 76 pct Mn.

Producing Point	Cents per-lb
Marietta, Ashtabula, O.; Alloy, W. Va.; Sheffield, Ala.; Portland, Ore	12.75
Johnstown, Pa.	12.75
Sheridan, Pa.	12.75
Philo, Ohio	12.75
S. Duquesne	12.75

Add or subtract 0.1¢ for each 1 pct Mn above or below base content.
Briquets, delivered, 66 pct Mn:

Carloads, bulk 14.80
Ton lots packed 17.20

Spiegeleisen

Contract prices, per gross ton, lump, f.o.b. Palmerton, Pa.

Manganese	Silicon	
16 to 19%	3% max.	$100.50
19 to 21%	3% max.	102.50
21 to 23%	3% max.	105.00

Manganese Metal

Contract basis, 2 in. x down, cents per pound of metal, delivered.
95.50% min. Mn, 0.2% max. C, 1% max. Si, 2.5% max. Fe.

Carload, packed 45.75
Ton lots 47.25

Electrolytic Manganese

F.o.b. Knoxville, Tenn., freight allowed east of Mississippi, f.o.b. Marietta, O., delivered, cents per pound.

Carloads 33.00
Ton lots 35.00
250 to 1999 lb 37.00
Premium for hydrogen-removed metal 0.75

Medium Carbon Ferromanganese

Mn 80 to 85%, C 1.25 to 1.50, Si 1.50% max. Contract price, carloads, lump, bulk, delivered, per lb of contained Mn... 25.50

Low-Carb Ferromanganese

Contract price, cents per pound Mn contained, lump size, del'd Mn 85-90%.

	Carloads	Ton	Less
0.07% max. C, 0.06% P, 90% Mn	37.15	39.95	41.15
0.07% max. C	35.10	37.90	39.10
0.10% max. C	34.35	37.15	38.35
0.15% max. C	33.60	36.40	37.60
0.30% max. C	32.10	34.90	36.10
0.50% max. C	31.60	34.40	35.60
0.75% max. C, 80.85% Mn, 5.0-7.0% Si....	28.60	31.40	32.60

Silicomanganese

Contract basis, lump size, cents per pound of metal, 65-68% Mn, 18-20% Si, 1.5% max. C for 2% max. C, deduct 0.2¢ f.o.b. shipping point.

Carloads bulk 13.80
Ton lots 15.45
Briquet contract basis carloads, bulk, delivered, per lb of briquet..... 15.10
Ton lots, packed 17.50

Silvery Iron (electric furnace)

Si 15.50 to 16.00 pct, f.o.b. Keokuk, Iowa, or Wenatchee, Wash., $100.00 gross ton, freight allowed to normal trade area. Si 15.01 to 15.50 pct, f.o.b. Niagara Falls, N. Y., $93.00.

Silicon Metal

Contract price, cents per pound contained Si, lump size, delivered, packed.

	Ton lots	Carloads
96.50% Si, 2% Fe	23.95	22.65
98% Si, 0.75% Fe	24.45	23.15

Silicon Briquets

Contract price, cents per pound of briquets, bulk, delivered, 40% Si, 2 lb Si, briquets.

Carloads, bulk 7.70
Ton lots, packed 10.50

Electric Ferrosilicon

Contract prices, cents per lb contained Si, lump, bulk, carloads, f.o.b. shipping point.

50% Si	13.90	75% Si	16.80
65% Si	15.65	85% Si	18.50
	90% Si	19.90	

Calcium Metal

Eastern zone contract prices, cents per pound of metal, delivered.

	Cast	Turnings	Distilled
Ton lots	$2.05	$2.95	$3.75
Less ton lots	2.40	3.30	4.55

Ferrovanadium

50-55% V contract, basis, delivered, per pound, contained V, carloads, packed.

Openhearth 3.20
Crucible 3.30
High speed steel (Primos) 3.40

Alsifer,

20% Al, 40% Si, 40% Fe. Contract basis, f.o.b. Suspension Bridge, N. Y., per lb.

Carloads ..... 10.65¢
Ton lots ..... 11.80¢

Calcium molybdate,

43.6-46.6% f.o.b. Langeloth, Pa., per pound Contained Mo. $1.28

Ferrocolumbium,

50-50%, 2 in. x D contract basis, delivered per pound contained Cb.

Ton lots $6.90
Less ton lots 6.95

Ferro-tantalum-columbium,

20% Ta, 40% Cb, 0.30% C, contract basis, del'd, ton lots, 2-in. x D per lb con't Sb plus Ta.... $4.95

Ferromolybdenum,

55-75%, 200-lb containers, f.o.b. Langeloth, Pa., per pound contained Mo.. $1.68

Ferrophosphorus,

electric, 23-26%, car lots, f.o.b. Siglo, Mt. Pleasant, Tenn., $4.00 unitage, per gross ton $90.00
10 tons to less carload $110.00

Ferrotitanium,

40% regular grade 0.10% C max., f.o.b. Niagara Falls, N. Y., and Bridgeville, Pa., freight allowed, ton lots, per lb contained Ti..... $1.35

Ferrotitanium,

25% low carbon, 0.10% C max., f.o.b. Niagara Falls, N. Y., and Bridgeville, Pa., freight allowed, ton lots, per lb contained Ti..... $1.50
Less ton lots $1.55

Ferrotitanium,

15 to 18% high carbon, f.o.b. Niagara Falls, N. Y., freight allowed, carload, per net ton $215.00

Ferrotungsten,

½ x down, packed, per pounds contained W, ton lots delivered $3.15

Molybdic oxide,

briquets, per lb contained Mo, f.o.b. Langeloth, Pa. $1.41
bags, f.o.b. Washington, Pa., Langeloth, Pa. $1.38

Simanal,

20% Si, 20% Mn, 20% Al, contract basis, f.o.b. Philo, Ohio, freight allowed, per lb.

Carload, bulk lump ..... 18.50¢
Ton lots, packed lump..... 20.50¢
Less ton lots ..... 21.00¢

Vanadium oxide,

86-89% V_2O_5 contract basis, per pound contained V_2O_5 ..... $1.33

Zirconium

contract basis, per lb of alloy

35-40% f.o.b. freight allowed, carloads, packed ..... 27.25¢
12-15%, del'd lump, bulk-carloads ..... 9.25¢

Boron Agents

Borosil, contract prices per lb of alloy del. f.o.b. Philo, Ohio, freight allowed, B 3-4%, Si 40-45%, per lb contained B

2000 lb carload $5.50

Bortam, f.o.b. Niagara Falls,

Ton lots, per pound..... 45¢
Less ton lots, per pound.... 50¢

Corbortam, Ti 15-21%, B 1-2%, Si 2-4%, Al 1-2%, C 4-5-7.5% f.o.b. Suspension Bridge, N. Y., freight allowed.

Ton lots per pound..... 14.00¢

Ferroboron, 17.50 min. B, 1.50% max. Si, 0.50% max. Al, 0.50% max. C, 1 in. x D, ton lots.... 1.20
F.o.b. Wash., Pa., Niagara Falls, N. Y., delivered 100 lb up

10 to 14% B ..... .85
14 to 19% 1.20
19% min. B. 1.50

Grainal, f.o.b. Bridgeville, Pa., freight allowed, 100 lb and over

No. 1 ..... $1.05
No. 79 ..... 50¢

Manganese - Boron, 75.00% Mn, 15.20% B, 5% max. Fe, 1.50% max. Si, 3.00% max. C, 2 in. x D, del'd.

Ton lots $1.46
Less ton lots 1.57

Nickel-Boron, 15-18% B, 1.00% max. Al, 1.50% max. Si, 0.50% max. C, 3.00% max. Fe, balance Ni, del'd less ton lots $2.15

RAILWAY EQUIPMENT
FOR SALE
Used - As Is - Reconditioned

RAILWAY CARS
All Types

SERVICE-TESTED
FREIGHT CAR REPAIR PARTS
For All Types of Cars

LOCOMOTIVES
Diesel, Steam, Gasoline, Diesel-Electric

SPECIAL OFFERING
50-TON CAPACITY GONDOLA CARS
Length—46'0" Drop Ends
Steel Underframes Steel Ends
Steel Sides Wood Floor
AB Air Brakes
Immediate Delivery!

RAILWAY TANK CARS and STORAGE TANKS
6,000- 8,000- and 10,000-Gallon
Cleaned and Tested

CRANES
Overhead and Locomotive

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"ANYTHING containing IRON or STEEL"

THE CLEARING HOUSE

News of Used and Rebuilt Machinery

Temperature Down . . . While there's a good level of activity in the Philadelphia area, as one dealer puts it, "the market's not exactly on fire."

Other dealers agree with this description. You hear terms like "decreased tempo," "reduced volume of sales," and "no upsurge in business" when they talk about sales conditions.

In specific terms they note that buyers are less urgent about purchasing used machinery. Customers seem to be taking more time to decide whether or not they'll buy. Sales which were formerly concluded rather quickly, now take considerably more time to close. Customers are doing more shopping around. Price consciousness is growing.

Counter offers are advanced by some buyers when price is quoted. In several instances sellers have been asked to include shipping charges in the sales price.

Reasons Why . . . The dealers aren't too pessimistic, however. Most feel a pickup is due and present sales are still good. In describing the current slackness they cite tight money as one probable factor.

Marketing conditions are also felt to be contributing. The continuing trend to auction sales with buyers doing their own bidding for equipment is also mentioned by the dealers.

Supply and Demand . . . Despite any letdown there's still a good demand for equipment of recent vintage which is in good condition. There aren't enough turret lathes, press brakes and shears to meet current demand. Dealers on the lookout for equipment are traveling far afield to find it.

King-Size Auction . . . A large variety of metalworking machinery and equipment will go on sale at a public auction at Lincoln Industries, Damascus, Va., on Jan. 30. The equipment, part of manufacturing facilities valued at $1 million, will be offered on the second day of a two-day sale. It includes complete tube forming equipment consisting of a tube former, tube and sheet benders and polishers; a complete stamping department; and eighteen spot and arc welders.

Also being sold is a tool room including a miller; sheet metal and fabricating machines containing a squaring shear, brakes and an automatic slitter; and an automatic nickel plating line and related equipment.

Pressing Business . . . What little demand there is in Detroit right now is for tool room equipment. Presses in particular are still very hard to find.

Dealers are wondering where they will get good machines once the seasonal slump ends and customers come into the market in earnest. They have just about written off the possibility of buying anything at auctions. The profit squeeze, dealers claim, tightens every time a new sale is held.

New York Report . . . Business in this market would be more brisk if customers were not aware that most of the machines in this part of the country have been cleaned out. For several types of machinery, such as rolling mills and cranes, buyers must reach out to other areas, buck stiff demand from local customers in most parts of the country.

The press market shows some variety, with demand for stamping presses a little on the slow side. But market for heavy and hydraulic presses is more than strong.

Generally speaking, the big problem continues to be lack of good late model used machinery in the market. Nobody likes the tight money situation, but most are learning to live with it.

CONSIDER GOOD USED EQUIPMENT FIRST

BENDER—PIPE
6" U. S. Pipe Bender, Titan Model
BENDING ROLLS
6' x 3/16" Niagara Initial Type
10' x 1/8" Bertsch Initial Type
10' x 1/8" King Pyramid Type
16' x 3/8" Niles Pyramid Type
30" x 3/4" Niles Pyramid Type
BRAKES—LEAF TYPE
8' x 3/16" Dreis & Krump
12' x 1/4" Dreis & Krump
BRAKES—PRESS TYPE
8' x 1/4" Geo. A. Ohl
10' x 1/8" Superior Hydraulic—NEW
12' x 1/8" Superior Hydraulic—NEW
CRANES—OVERHEAD ELECTRIC TRAVELING

5 ton Whiting	48' Span 220/3/60 A.C.
5 ton Shaw	56' Span 230 Volt D.C.
10 ton P&H	38' Span 230 Volt D.C.
10 ton Cleveland	47' Span 440/3/60 A.C.
15 ton P&H	48' Span 230 Volt D.C.
15 ton Morgan	70' Span 220/2/60 A.C.
15 ton P&H	72' Span 230 Volt D.C.
25 ton Cleveland	70' Span 220/2/60
120 ton Niles	68' Span 440/3/60 A.C.

DRAW BENCH
10,000# Aetna Standard, Length of Draw 44'. Used to draw SAE 1035 Welded Steel Tubing
FORGING MACHINES
1" to 5" Acme, Ajax, National
3" Acme Model XN, Air Clutch, NEW 1954
HAMMERS—BROAD DROP—STEAM DROP—STEAM FORGING—800 lb. to 20,000 lb.
LEVELER—STRETCHER
100 ton Hydr. Stretcher Leveler, Capy. .032" Ga. 36" Width, 96" Length; 4 Sheets in a Pack
LEVELLERS—ROLLER
48" Aetna Standard, 17 Rolls 3⅜" Dia.
54" McKay, 17 Rolls 3⅜" Dia.
PRESSES—HYDRAULIC
750 ton Baldwin Triple Acting Bolster 84 x 133"
1200 ton United Steam Hydraulic Forging Press
4500 Baldwin-Lima-Hamilton Hydr. Forging Press
PRESSES—HYDRAULIC WHEEL
600 ton N-B-P, 96" Between Strain Bars
800 ton N-B-P, 96" Between Strain Bars
PRESSES—STRAIGHT SIDE
Verson 81-40 200 ton, 36" Stroke, Bed 40"x44"
Bliss #8C 300 ton, 18" Stroke, Bed 44"x83"
Toledo 203E Overhanging 10" Str. 38x40" Bolster
PUNCH & SHEAR COMBINATIONS
Cleveland Style EF Single End, 42" Throat
Cleveland Style G Single End, 60" Throat
Cleveland Style W, 60" Throat
No. 1½ Buffalo Universal Ironworker
ROLLS—FORMING
M1½-H Yoder 10 Stand, Roll Shaft Dia. 1½"
Model 14 L-M-1 Tishken Roll Forming Machine 1½" Dia. Spindle, 3½" Capacity, With Cut-Off
ROLLS—PLATE STRAIGHTENING
72" Bertsch Seven Rolls, 7" Dia.
72" Hilles & Jones, Six Rolls 11" Dia.
ROLLING MILLS
9" Bar Mill
18" Three High Bar Mill
10" x 14" Single Stand Two High
12" x 12" Single Stand Two High
12" x 16" Single Stand Two High
16" x 24" Farrel Two Stand, Two High
16" x 30" Single Stand Two High
20" x 38" Single Stand Two High
26" x 72" Cold Rolling Mill
44" x 144" Three High Sheet Mill
22" x 40" Three High Sheet Mill
SHEAR—ALLIGATOR
No. 4 Mesta RH LK, Capacity 2" x 12"
SHEARS—SQUARING
6' x 10 Ga. Niagara No. 672
8' x ⅛" Niagara—NEW 1952
10' x ⅜" Niagara—NEW 1950
12' x ½" Cincinnati
16' x 3/16" Long & Alstatter
SHEAR—MISC.
Lowey Flying Shear with ratchet driven measuring rolls, Capacity .125" x 36" wide
SLITTERS
12" Blake & Johnson
24" Blake & Johnson
36" Wean Slitting Line
32" Stamco Slitting Line
STRAIGHTENER
Kane & Roach Type B, Capy. ⅜" Hex., Flat 1"x11/32" Flat & Edge 1⅞"x3/16"
SWAGING MACHINE
#6½A Fen. Capacity 2¼" Tube, 3⅜" Solid 10" Die Length Hydraulic Feed, LATE
TESTING MACHINES
20,000# Baldwin Universal Hydraulic
60,000, 100,000, 200,000 Olsen & Riehle Universal
50,000 and 300,000 lb Compression
TUBE MILL
Etna 1K Welded Tube Mill, Cut-off & Transformer Capy. ½" OD 0.28 wall to 2" OD .120 wall
WELDING POSITIONERS
16,000# Worthington #160—Late
36,000# P&H Model WP-18 Late

• Manufacturing

A. T. HENRY & COMPANY, INC.
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Telephone COrtlandt 7-3437

Equipment •

Confidential Certified Appraisals
Liquidations — Bona Fide Auction Sales Arranged

Consulting Engineering Service
Surplus Mfg. Equipment Inventories Purchased

4" National Upsetter High Duty, guided overarm slide, air clutch
Ajax & National Upsetters, suspended slide, 2½", 3", 4"; similar upsetters not suspended slide, ¾", 1", 1½", 2", 3"
5" Acme Upsetting & Forging Machines suspended slide, cam side die slide
700-ton Ajax High Speed Forging Press
50,000# Standard Double Draw Bench
#3 Abramson Bar & Tube Straightener
Pels FV-75 Bar & Biller Shear, Cap. 7½" rd
10' x ½" Plate Shear, Long & Allstatter 10" throat, M.D. Rebuilt
Also 10' x ¾" L & A
Hilles & Jones and Buffalo Shears 1½", 2", 2½", 3", 3¼", 4" and 4¼"
1600 Chambersburg Model F Board Drop Hammers, Roller bearing; double V-ways, Built 1943
1500 lb. Niles Steam Forging Hammer
Bradley Hammers, various sizes, including 500# Upright
Nazel Air Forging Hammers, #2-B, 5-N
Williams White Bulldozers, #22, #3, #4, #25, #6, #29 U-type
Landis Landmaco and other Landis Threading Machines from ⅜ to 4"
Single and Double End Punches
Angle Shear H & J. 6 x 6 x 1"
No. 3 Motch & Merryweather Saw, with Saw Grinder
Wide assortment of heat treating furnaces, electric and oil

BOLT, NUT AND RIVET MACHINERY, COLD HEADERS, THREAD ROLLERS, THREADING MACHINES, TAPPERS, COLD BOLT TRIMMERS, SLOTTERS, HOT HEADERS AND TRIMMERS, COLD AND HOT PUNCH NUT MACHINES.

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REBUILT — GUARANTEED ELECTRICAL EQUIPMENT

PACKAGE MILL DRIVES IN STOCK

1500—HP G.E. mill motor, rev., 600-VDC, 150/300 R.P.M., and 1250-KW G.E. M-G Set, 600-VDC with 1750-HP, .8 P.F. synchronous motor, 2300/4160-Volt, 3 phase, 60 or 25 cycle. Designed for variable voltage drive, all enclosed, forced ventilated.

IDEAL REEL DRIVES

(2)—600-HP Allis-Chalmers mill motors, 600-VDC, 300/600 R.P.M., with a 1200-KW, 600-VDC Westinghouse M-G Set, 1750-HP synchronous motor, 4160/2300-Volt, 3 phase, 60 cycle.

(2)—275-HP Westinghouse mill type motors, 230-Volt, 425/850 R.P.M., with 2 or 3-unit, 600-KW M-G Set, 250-VDC and 900-HP synchronous motor, 2300-Volt, 3 phase, 60 cycle.

(2)—100-HP Electro-Dynamic motors, 230-VDC, 450/1350 R.P.M., with 3-unit, 300-KW Allis-Chalmers M-G Set, 2300/440-Volt, 3 phase, 60 cycle.

SPECIAL

(2)—600-HP Westinghouse mill motors, 230-VDC, 110/220 R.P.M., anti-friction pedestal bearings.

MOTOR GENERATOR SETS

Qu.	K.W.	RPM	Make	Volts DC	Volts AC
1	1250	720	G.E.	600	2300/4160
1	1000	720	Whse.	600	2300/4160
1	500	1200	Whse.	125/250	2300/440
1	500	720	Cr.Wh.	575/600	2300
1	300	1200	Al. Ch. 3-unit	250	2300
1	300	1200	G.E.	250	2300
1	200	1200	Cr. Wh.	250	2300
1	200	1200	Elliott	125	4000/2300
1	200	900	G.E.	250	2300
1	175	1200	G.E.	250	440/220
2	150	1200	Whse. SK	250	2300/440
2	150	1200	Reliance	125	2300/440
1	150	1200	G.E.	250	2300
1	100	1200	Whse. SK	125/250	440/220
1	100	1200	Al. Ch.	250	4600/2300

T. B. MAC CABE COMPANY
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RE-NU-BILT
GUARANTEED
ELECTRIC POWER EQUIPMENT
A. C. MOTORS
3 phase—60 cycle
SLIP RING

Qu.	H.P.	Make	Type	Volts	Speed
2	1750	G.E.	M-579BS	4800	1800
	1500	G.E.	MT	6600	257
1	1100	F.M.	OVZK, B.B.	4800	1800
1	1000	A.C.	Mill	2300	340
1	800	G.E.	MT	2300	293
1	750	G.E.	MT-573	2200	1180
1	700	A.C.		2300	500
1	500	Whse.	CW	550	350
1	400	Whse.	CW	440	514
1	350	G.E.	IM-17A	440/2300	720
1	250	G.E.	MT-424Y	4000	257
1	250	Cr. Wh.	Size 290	2300	350
1	250	Al. Ch.		550	600
1	200	G.E.	IE13 B-M	220/440	1760
1	200	G.E.	MT-557Y	220/440	1760
1	200	Cr. Wh.	204JB	440	590
1	200	G.E.	IM	440	435
1	200	G.E.	1M	2200	580
1	150 (unused)	Whse.	CW	2300	435
3	125	A.C.		440	865
1	125	Al. Ch.		440	720
1	100	G.E.	IM-16	2200	435
1	100	G.E.	IM	440	690
4	100	A.C.	ANY	440	695

SQUIRREL CAGE

1	800	G.E.	KT-573	2200	1180
1	650	G.E.	FT-559BY	440	8570
2	450	Whse.	CS-1420	2300/4150	354
1	400	G.E.	IK	2200	500
1	300	G.E.	KT-559A	2300	1775
1	200	G.E.	IK-17	440	580
2	200	G.E.	KT-557	440	1800
1	150/75	G.E.	IK	440900/450	
1	150	Whse.	CS8568	440	880
1	150	Whse.	CS	440	580

SYNCHRONOUS

Qu.	H.P.	Make	Type	Volts	RPM
1	7000	G.E.	ATI	2200/6600	600
1	4250	C.W.	3561SLA1000/6900/13800		514
1	2850	Whse.	.8p.f.	2300/4600	514
1	2800	Whse.	.8p.f.	2300	720
2	2000	Whse.		2300	120
2	1750	G.E.	ATI	2300	3600
1	735	G.E.	ATI	2200/12000	600
1	450	Whse.		2200	128.5
1	325	G.E.	ATI	440	1800
1	225	G.E.	ATI	440	1800
1	100	G.E.	TS-7556	220/440	900

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COMPRESSOR 150# AIR TANK MOUNT BRUNNER 5HP GRINDER CONTINUOUS STRIP MATTISON 464 24" LEVELLER 17 ROLL BACKED UP 3" x 30" FESSLER LEVELLER 5 ROLL 5¼" x 30" FESSLER HVY DUTY ROLLING MILL GRADING 6" x 5" STANDARD, 7 ROLLS ROLLING MILL 6" x 8" STANDARD RLR BGS 15HP ROLLING MILL FARREL 16" x 20" 150HP DRIVE
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6' x ¼" Lown Initial Type Bending Roll, M.D.
No. 1 Buffalo Forge Vertical Angle Bending Roll Leg-In Attachment, M.D.
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1—28" REVERSING BREAKDOWN MILL.
1—25" & 42" x 60" HOT STRIP MILL, 4-high.
1—28" PINION STAND, 2-high, modern design.
1—16" x 24" COLD MILL, 1 stand.
1—8" x 10" COLD MILL, 2-high; roller bearings, coil box, recoiler, D.C. variable speed drive.
1—5" x 4" COLD MILL, 2-high; roller bearings; coil box; coiler; D.C. drive.
1—18" BAR MILL, 3-high.
1—16" BAR MILL, 3-high, single stand, with motor and gear reducer.
1—12" BAR MILL, 3-high, 7 stands, with motor and gear reducer.
1—10" ROD MILL.
3—MECHANICAL HOT BEDS for bars, 150 ft. and 120 ft.
1—ROLL FORMING MACHINE, Kane & Roach, for .072" x 5⅝" wide stock.
1—COIL-UP-AND-DOWN ENDER for 54" dia. x 44" wide coils.
1—34" x 192" ROLL GRINDER with motors and controls.
1—44" ROLL LATHE, enclosed headstock, tailstock, piano rest, 20 HP 500/1500 RPM, 230 volts D.C. motor and controls.
2—ROLLER LEVELERS, McKay, rolls 80" face x 5¼ dia., with gear box and universal spindles.
1—STRETCHER LEVELER for sheets, 500,000 lb. capacity.
2—KANE & ROACH BAR AND ANGLE STRAIGHTENERS, sizes #4 and #5.
1—KANE & ROACH 2-WAY FLAT AND SHAPE STRAIGHTENER, capacity ½" square or 1½" x 3.32" flat.
1—#1 MEDART STRAIGHTENER, capacity ½" to 2½" bars, tubes.
3—PICKLING MACHINES for sheets, Mesta.
1—SCRUBBER AND DRYER for sheets 66" wide.
2—PACK FURNACES for hot sheet mills, 62" x 60', double chamber.
1—500 LB. SIZE "U" Pittsburgh Lectromelt Furnace, with 300 KVA transformer.
2—UNITED HOT SAWS, 50", sliding frame.
1—TUBE CUT-OFF MACHINE, Aetna-Standard double end, 3" to 8⅝" O.D.
1—UNITED #4 BAR SHEAR, vertical open side.
1—CRACKER SHEAR, AETNA-STANDARD, 2½" bars.
3—WILLLIAMS & WHITE bar shears.
1—HALLDEN AUTOMATIC STRAIGHTENIG AND CUTTING MACHINE, max speed 120 ft. per min., size range 5/32" to 11/32" rounds.
1—ROTARY SIDE TRIMMING SHEAR, capacity 112" x ⅜" plate.
1—192" x 10 GAUGE NIAGARA SQUARING SHEAR, little used.
1—156" x ⅜" MESTA SQUARING SHEAR.
1—156" x ¼" SHEET SQUARING SHEAR.
1—120" x 10 GAUGE WYSONG & MILES SQUARING SHEAR.
1—SLITTING SHEAR FOR SHEETS, Mesta, 92".
1—FLYING SHEAR, capacity ¼" thick x 36" wide in lengths from 2½ ft. to 12 ft.
1—156" BRIDGEPORT SHEAR KNIFE GRINDER.
6—SWING GRINDERS for wheels 24" dia. x 3" face.
1—ALLIANCE LADLE CRANE, 4 girders, 80 ton main hoist, 2o ton auxiliary, 55'5" span, 42' lift.
1—DRAWBENCH, Mesta, oil-hydraulic, for 3 strands of bars 20' long.
1—MEDART 6HOF BAR TURNING MACHINE, capacity 1¼" to 6" round.
1—66" GALVANIZING LINE for sheets, with 2 roller levelers.
1—AIR COMPRESSOR, Worthington, 13" & 8" x 10", 110 lbs. pressure, 75 HP A.C. motor.
1—TOLEDO DIAL SCALE, 12500 lb. capacity, 92" x 71" steel platform.
3—LIFT TRUCKS, 5-ton Elwell-Parker.
1—3500 HP GEAR DRIVE, 514 to 80 RPM, 6.45 to 1 ratio.
1—2000 HP GEAR DRIVE, 200/580 RPM input, 4.44 to 1 ratio.
1—2000 HP GEAR DRIVE, 125/360 RPM input, 2 to 1 ratio.
1—1600 HP GEAR DRIVE, 514 to 87 RPM, 5.9 to 1 ratio.
1—3500 HP MOTOR, 11000 volts, 3 phase, 60 cycle, 514 RPM.
1—1200 HP MOTOR, 2200 volts, 3 phase, 60 cycle, 353 RPM.

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SELECT MACHINE TOOLS

BORING MACHINES
3" bar Universal Tri-Way horizontal, table type, (2), one late.

GRINDING MACHINES
72" Hanchett 3-spd. rotary surface, new 1946.
14" x 36" Pratt & Whitney hyd. vert. surface, 1942.
No. 74 Heald hyd. pl. internal, X-sliding H. S., 1941.
16" x 36" Landis type C hyd. pl. cylindrical, 1942.

HAMMERS
No. 3C Chambersburg pneumatic, serial No. 2297.
No. 6-i Nazel, pneumatic, late.
No. 6B Nazel, self-contained.

LATHES
No. 3 Gisholt Univ. Turret Lathes (2), 1942.
No. 5 Gisholt ram type Univ. Turret Lathe, 1940.
15" x 30" Lipe Carbo-Matic, 1942.
126" x 96" CC Niles Bement Pond engine lathe, 80 HP, M.D.

MILLING MACHINES
No. 2 Brown & Sharpe vertical mill, new 1943.
No. 5-48 Cincinnati hydromatic duplex mill, serial 3B51DIK-5.
No. 2-24 Cincinnati automatic simplex mill, serial No. 1B3P1T-1.

PRESSES
200 ton No. 7-72 Bliss S.S. D.C. Press, Air Clutch.
350 ton Elmes self-cont. 4-post Hydraulic Press, 1944.
500 ton No. 1039 Hamilton D.C. adj. hed. 60"x102".
800 ton Model 2E-48-800 Hamilton, S.S. air clutch, new 1947.
2000 ton No. 6 National Maxipress Forging Press.

SHAPERS & SLOTTERS
32" G & E Invincible, F.M.D.
36" Rockford hyd. vertical slotter, new 1944.

UPSETTERS
1½" National Upsetter, guided ram, hard ways.
3" Ajax upsetting & forging machine, air clutch, serial 3614.
3" National high duty forging machine, serial 14195.
3½" Ajax suspended slides, steel frame.
4" National high duty, susp. & guided rams.
7½" National Upsetter, air clutch, new 1944.

1000 Tools in Stock

Free Illustrated Catalog

MILES MACHINERY CO.
PHONE SAGINAW 2-3105
2041 E. GENESEE AVE. SAGINAW, MICH.

FOR SALE

2 complete Stamco 32" Slitting Lines. Equipped with pay-off and take-up reels for coils up to 6,000 lbs. Gravity feed and delivery tables. Automatic scrap cutters.

Also 1 K & R 48 inch Roller Leveller, eleven 4½ inch rolls. All in excellent condition.

Robinson Steel Warehouse Co.
Box 298 Wheaton, Illinois

eastern Rebuilt Machine Tools

THE SIGN OF QUALITY—THE MARK OF DEPENDABILITY

BROACHING MACHINES
75 H.P. LaPointe Hydraulic Broach, m.d.
12 x 72" Thompson Automatic Flat Broach, m.d.
10 ton, 84" stroke LaPointe Single Ram Vertical Surface Broach, m.d., late
Type SBD-42-6 American Vertical Hy. Dup. Broach
Type SBD-48-15 American Vertical Dup. Ram Surface Hydr. Broach
No. 3 Oilgear Hydraulic Broach, type XA, 54" stroke, m.d.

RADIAL DRILLS
5'-14" col. American Triple Purpose, m.d.
5'-14" col. Fosdick, m.d.
5'-14" col. Carlton, m.d.
5'-15" col. American, m.d., on arm
6'-17" col. American Triple Purpose, m.d. on arm
7'-16" col. American Triple Purpose, m.d.
8'-17" col. Dreses, gear box m.d.
Baush Radial Drilling & Tapping Machine, m.d.

BALL BEARING DRILLS
No. 4 Fosdick, 8" overhang, High Speed, m.d.
No. 15 Buffalo Floor Model, m.d.
No. ½, 1 & 2 Avey, m.d.
No. ½ Avey MA-8, m.d.
No. 1B Edlund, m.d., new
No. 4BM Fosdick, single spindle, H.S., m.d.
1 spindle No. 2MA6 Avey High Speed, m.d., 7½" overhang, 1943
No. 2B—8" H.D. Edlund H.S., m.d.
2 spindle Allen, belted m.d., 8" overhang
2 spindle No. 2 Avey High Speed, belted md.
2 spindle No. 2B MA1 Avey Production Type, m.d.
2 spindle Avey, size No. 1, Type B, style VHP, m.d., 8" overhang
2 spindle No. 3MA6 Avey High Speed, m.d.
2 spindle No. 2 Leland-Gifford High Speed, 8" overhang, m.d.
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No. 2LMS Leland-Gifford, single spindle, High Speed, m.d.
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Cutting speed from 60 to 240 feet per minute
Two machines—One left hand, one right hand
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230 volts D.C., 850 to 1700 RPM, Frame 131
Coolant pumps motors 4-900 RPM ¼ HP, 3/60/440
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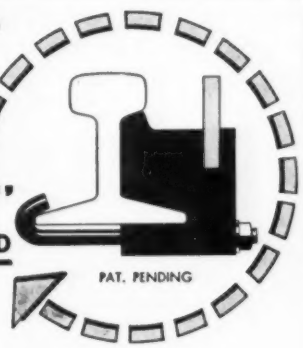

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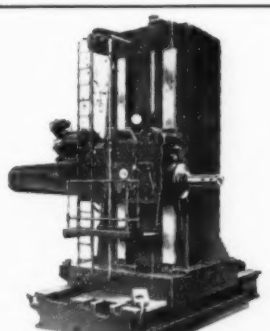

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ONE—Niles-Bement-Pond planer. 14' 2" between housing. 24" stroke. Box table. Height rail 9'8". 2 side jacks. 2 rail-head jacks. 2 side jacks travel 11'. Speed cut stroke 25' P.M. Return speed 35'. Motor: 50 HP, 230 V. DC, speed 200 to 1200 RPM. Feed motor 15 HP, Rail motor 5 HP, Controls—Westinghouse Electric Company. New.

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HPM 750 T. HYDRO PRESS, straight side with die cushion & bolster, 8" thick, 36" x 36", max. daylight w/slide up 42", new '35, shut height minimum 24"
BLISS 1500 T. DOUBLE CRANK, DOUBLE ACTION PRESS.
BLISS #10-84 STRAIGHT SIDE PRESS, 400 ton, 43½ x 83" bed; 16" stroke, 8½ SPM; air cushion; 50 HP motor.
90 TON BLISS #6 DOUBLE ACTION PRESS, new '42; 2" inner, 5" outer stroke; 13" shut height; drawing slide 16½", 85 SPM, excellent condition.
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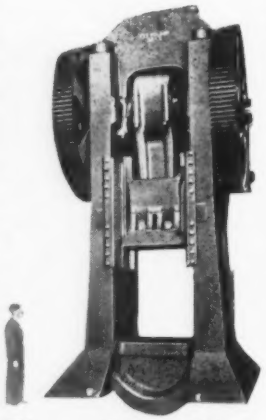

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Item No.	
1	#2 Sheet Mill, two 2 high stands alike. Roll body: 24" dia. x 34" length, 18" dia. necks. Drive: 26" x 45" vertical steam engine, 258 HP. Bottom roll coupled direct. Top roll friction driven. Complete and including all available spare parts.
2	#5 Sheet Mill, three stands; two 2 high finishing, 20" dia. x 28" body, 16" dia. neck, top roll balanced but not driven; one 2 high roughing, 19" dia. x 40" body. 15" dia. neck, both rolls driven. Pinions—open type. Drive: 28" x 46" horizontal steam engine, 350 HP. Allis-Chalmers. Complete and including all available spare parts.
3	#3 Sheet & Plate Mill, three 2 high stands; 1—28" dia. x 84" body, 21" dia. neck, top roll balanced but not driven; 1—24" dia. x 40" body, 20" dia. neck, top roll balanced but not driven; 1—24" x 50" body, 20" dia. neck, both rolls driven. Pinion—open type. Drive: 26" x 30" horizontal steam engine, 350 HP. Complete and including all available spare parts.

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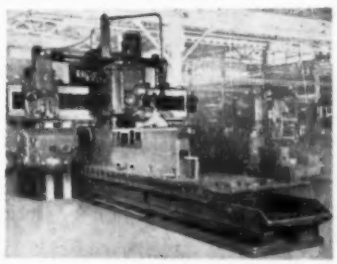

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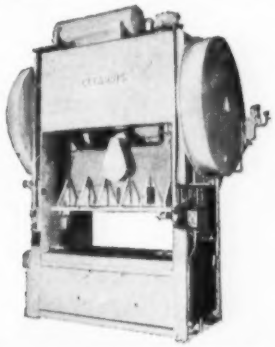

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WELDING ENGINEER — Graduate engineer. Minimum of three years' shop experience. Must know automatic welding processes and equipment. Excellent opportunity for young, aggressive individual. Location, Philadelphia area. Reply with resume and salary expected. Address Box G-478, care *The Iron Age*, Chestnut & 56th Sts., Philadelphia 39.

SITUATION WANTED

STEEL PLATE FABRICATOR, 18 years' experience in all operations including machine shop, engineering, estimating, productions, sales and shop operations, heavy experience in large structures. Will relocate, seeking sales or manufacturing management, now available. Address Box G-475, care *The Iron Age*, Chestnut & 56th Sts., Philadelphia 39.

PITTSBURGH REPRESENTATION, Ohio, Penna., W. Va., calling steel, oil, coal, chemical, food industries. Top level experience, finest references, youthful, aggressive. Chemistry, Pitt; Business, Yale. Excellent personality, appearance. Address Box G-477, care *The Iron Age*, Chestnut & 56th Sts., Philadelphia 39.

MANAGER OR CONSULTANT in welded fabrication or machinery, pipe, plate or sheet metal products. Modernizing of welding, handling, incentives and product design. Contract or consulting basis. Mid Atlantic or New England locations. Address Box G-479, care *The Iron Age*, Chestnut & 56th Sts., Philadelphia 39.

EMPLOYMENT SERVICE

HIGH GRADE MEN — Salaries $5,000 to $25,000. Since 1915 thousands of Manufacturing Executives, Engineers, Sales Managers, Comptrollers, Accountants, and other men of equal calibre have used successfully our confidential service in presenting their qualifications to employers. We handle all negotiations. Submit record with inquiry. The National Business Bourse, 20 W. Jackson Blvd., Chicago 4.

ACCOUNTS WANTED

Well established manufacturing representative concentrating on Steel Maintenance and Allied Industry, desires additional line.
J. W. HARVEY CO.
15 South Austin Blvd., Chicago, Illinois

why make your salesman an advertising medium?

Our text for today is taken from the plaint of a young industrial salesman whose company issues a catalog, exhibits in a few trade shows, but does no other advertising.

"When I make a call," he told us, "I not only have to introduce myself—I have to introduce my Company. By the time I have explained who we are and what we make, I have used up a large part of the time the prospect is willing to give me. In my field we sell by picking out from our line the type of products the prospect uses and showing him what these products will do for him. If the Company would use a well-balanced advertising program, I'd have at least 20 more minutes of *real* selling time on every call."

To our way of thinking, that salesman appreciates the value of his own time and his Company's dollars.

Selling any product to industry involves matching product information to the prospective buyer's problems. That's a job that can be done only by personal selling. That's why you use salesmen—at an average cost of approximately $20 per call.

When you use part of a salesman's time on a job that can be done more cheaply—and far more effectively—by some form of advertising, you are tossing away a considerable portion of your sales dollar. *Your salesman is just about the most expensive advertising medium you can use!*

National Industrial Advertisers Association, Inc.

271 Madison Avenue, New York 16, New York

An organization of over 4000 members engaged in the advertising and marketing of industrial products, with local chapters in ALBANY, BALTIMORE, BOSTON, BUFFALO, CHICAGO, CLEVELAND, COLUMBUS, DALLAS-FORT WORTH, DENVER, DETROIT, HAMILTON, ONT., HARTFORD, HOUSTON, INDIANAPOLIS, LOS ANGELES, MILWAUKEE, MINNEAPOLIS-ST. PAUL, MONTREAL, QUE., NEWARK, NEW YORK, PHILADELPHIA, PITTSBURGH, PORTLAND, ROCHESTER, ROCKFORD, ST. LOUIS, SAN FRANCISCO, TORONTO, ONT., YOUNGSTOWN.

METALWORKING BRIEFS

Unemployment Pay For Southern Strikers

In Birmingham, Ala., 13,000 steelworkers have been ruled eligible for unemployment benefits they claimed during a two-month trainmen's strike last year at U.S. Steel's Tennessee Coal & Iron Div. Payment is being held up, however, pending decision on a company appeal.

Winter Slows Production In Cleveland

Last week's sub-zero cold wave took its toll in Cleveland metalworking. Midland Steel Products Co. suffered $1 million property damage and an indefinite shutdown due to fire in a paint department. A natural gas pipeline break in Kansas caused Ford Motor Co.'s auto engine foundry to shut down three days. Republic Steel shifted to coke oven gas until natural gas supplies were restored.

Northeastern Cuts Ingot Production

Northeastern Steel Corp., Bridgeport, Conn., last week suspended steelmaking operations temporarily. The reason: a delay in bar mill operations caused billet inventories to pile up. Ingot production is being held up while the excess billets are worked off.

Sales Push For Gray Iron Founders

The Gray Iron Founders Society is staging a series of nine regional marketing meetings beginning Feb. 4-5 in Cincinnati. Other meetings will be in Chicago, Davenport, Ia., Cleveland, San Francisco, Sturbridge, Mass., Hamilton, Ont., Altantic City and Marshall, Mich.

Imports Worry Brass Mills

The copper and brass industry is concerned over growing competition from foreign mills (see p. 126). T. E. Veltfort, manager of the Copper & Brass Research Assn., says: "We are very much concerned with the growing tonnages of imports of all copper and brass mill products, including copper sheets, rod and tube, as well as copper-base alloy sheets, strip, rod, wire and tube. While no definite conclusions have been as yet made upon which to base an effective course of action, we are exploring all avenues of approach that show promise of affording effective relief as soon as possible."

Several reports have indicated that definite action is being taken by the copper and brass mill industry. Mr. Veltfort emphasized that this is not correct, but that a comprehensive survey is being made by the association to determine what action might properly be taken.

Among the possible courses of action: control measures such as tariffs and quotas, the "escape clause" procedure applicable to tariffs, Section 7 of the Defense Act which affords protection to defense industries, and the Anti-Dumping Act. The measures to be taken will depend largely on the facts which are being assembled in a survey by Clarence L. Hancock, who has been engaged by the association for the task.

ADVERTISERS

An asterisk beside the name of advertiser indicates that a booklet, or other information, is offered in the advertisement. Write to the manufacturer for your copies today.

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MACLEOD *Custom-Built*
BLAST CLEANING ROOMS

MACLEOD offers complete designing, fabrication, and installation of abrasive blast cleaning rooms, abrasive reclaiming systems, blast generators, and dust collecting systems—designed to meet your specific needs.
The room installation illustrated was custom-built by MACLEOD for the renovation of various types of military vehicles. It is served by a continuous, automatic blast generator, abrasive reclaiming and cleaning system, and a dust collecting system with a 54,000 cu. ft. per minute capacity. The floor is stressed to support vehicles up to 45 tons. Write for descriptive literature on MACLEOD Blast Cleaning Rooms, Cabinets and Machines.

Our 60TH ANNIVERSARY YEAR
The MACLEOD Company
44 MOSTELLER RD., CINCINNATI 41, OHIO

more and more manufacturers are saying: "Let's use
GRIFFIN®
COLD ROLLED STRIP STEEL"

Made to your specifications in all thicknesses from .012 to .375 inches and widths from ½" to 19" depending upon gauge

NARROW ROLLED ROUND EDGE STRIP STEEL In stock at
CENTRAL STEEL & WIRE CO.
Detroit, Chicago, Cincinnati
Wm. H. LEONORI & CO., Inc.
New York City

GRIFFIN
"since 1899"
MANUFACTURING CO. ERIE, PA.

STEEL TUBING
SERVICE STEEL
SEAMLESS or WELDED
AIRCRAFT - MECHANICAL
PRESSURE - STAINLESS
STAINLESS PIPE & FITTINGS
DETROIT • BUFFALO • CHICAGO • CINCINNATI • LOS ANGELES

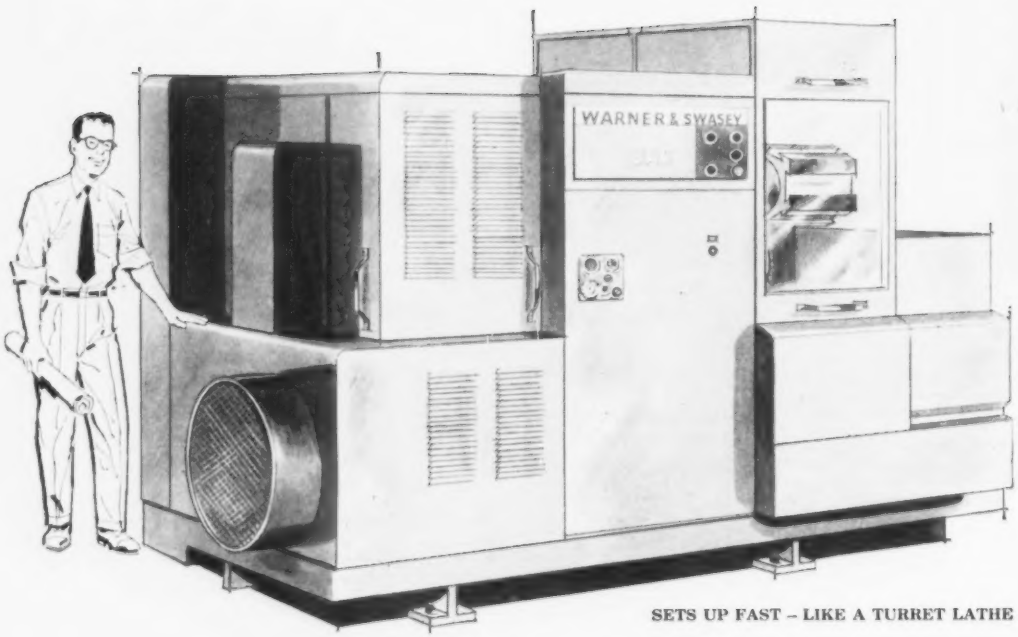
New **ARMSTRONG** *Adjustable Step Block*

ARMSTRONG Adjustable Step Blocks provide safe, rigid, easily adjustable support for setting-up work. Eliminate haphazard set-ups, save time and labor.

ARMSTRONG BROS. TOOL CO.
"The Tool Holder People"
5209 W. Armstrong Ave., Chicago 30, U.S.A.

Write for Catalog showing complete System of Armstrong Set-Up and Hold-Down Tools.

NEW...



SETS UP FAST – LIKE A TURRET LATHE

Warner & Swasey 3AC Single Spindle Automatic Chucker widens field of profitable turning jobs

This versatile, new model was engineered for fast, automatic machining of your larger, complex chucking jobs. It provides accuracy, metal removal capacity, tooling flexibility and set-up ease and speed heretofore unobtainable by automatic operation in this work range.

For over eight years, enthusiastic users have told us, "Performance records of our Warner & Swasey Single Spindle Chucking Automatics have been phenomenal."

The 1AC model, first introduced at the 1947 Machine Tool Show in Chicago, met with instant field acceptance. In 1953 — 88 customers placed orders for the 2AC model before the first machine was ever built!

Now, Warner & Swasey announces a new, larger capacity, more powerful 3AC model with a 15-inch diameter chuck and a 40-horsepower motor, which will provide fast, automatic production for your larger pieces — precision and otherwise — in all lot sizes.

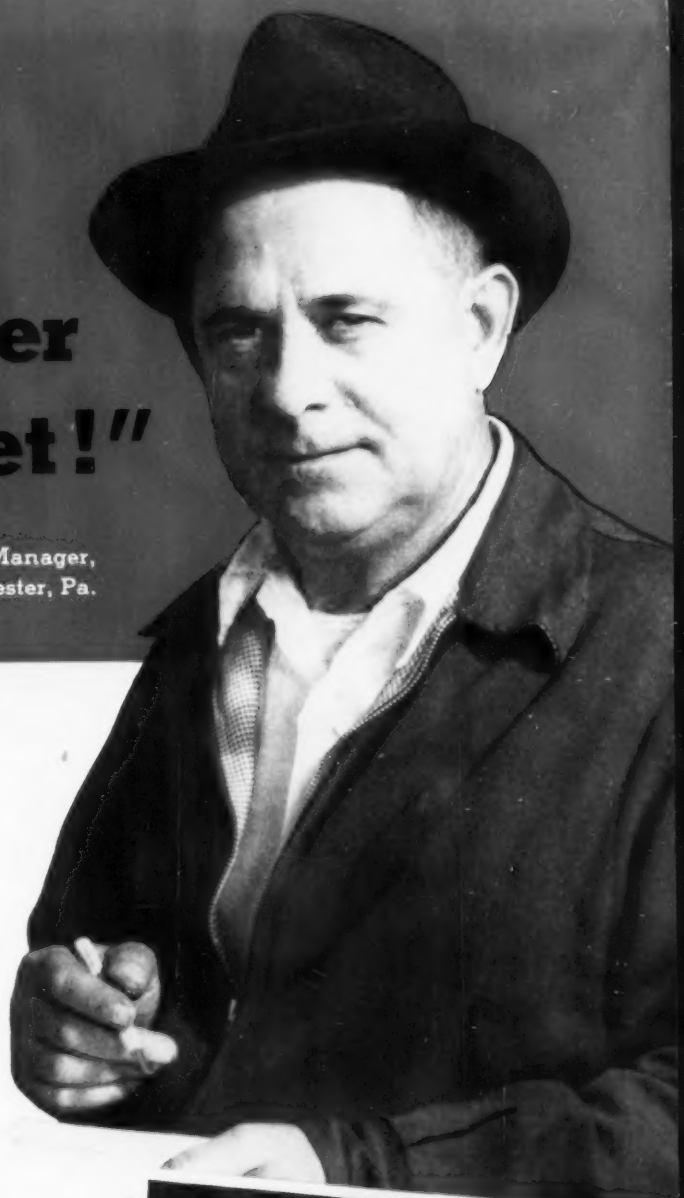
Our Field Representative will be glad to give you complete details on how this new machine can increase profits on your operations. Why not call him in, today?

WARNER & SWASEY
Cleveland
PRECISION MACHINERY SINCE 1880

No Matter Which Way You Turn...Warner & Swasey Cuts Costs

"Pangborn Blastmaster? Nothing better on the market!"

says WILLIAM BURROWS, Plant Manager,
The Atlantic Steel Castings Co., Chester, Pa.



"When we needed new blast equipment," says William Burrows, "we checked around. We found that the Pangborn Blastmaster Barrel had *more* advantages—more of the things that add up to a good deal for The Atlantic Steel Castings Co. Our Pangborn is one of the best things we ever invested our money in."

Blast cleaning can represent a sizable investment. If you're in the market, you would be wise to compare the Blastmaster Barrel against competitive makes. The Blastmaster is tailored to individual requirements in sizes of 1½, 3, 6, 12, 18, 27 cu. ft. Many exclusive features.

For details, send for Bulletin 225. Write to PANGBORN CORPORATION, 1500 Pangborn Blvd., Hagerstown, Maryland.

Because of this 27 cu. ft. Blastmaster and other Pangborn equipment, Atlantic has cut cleaning time from two full 8-hour shifts (16 hours every day) to only *six* hours. To achieve peak cleaning efficiency, this size Blastmaster uses *two* Rotoblast units for *double* hot spots in cleaning area.

Pangborn

blast cleans cheaper

Speeds materials handling 30% to 40%

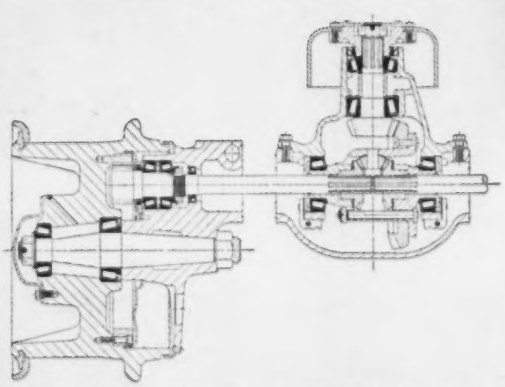
...on TIMKEN® bearings

THIS Towmotor Model 460, known as "The One-Man Gang" in the automotive industry where every minute counts in meeting tight production schedules, cuts materials handling time up to 40%. And Timken® tapered roller bearings "roll the load" in steering kingpin, steering wheel, drive wheel, jack shaft, differential gear shaft and pinion—keep the Model 460 on the go.

Highly maneuverable, the Towmotor 460 must make countless starts and stops—putting heavy load on the pinion. Timken bearings keep the gears in accurate alignment despite these heavy changing loads. The tapered construction of Timken bearings lets them take radial and thrust loads in any combination. And full line contact between Timken bearing rollers and races gives them extra load-carrying capacity. No extra thrust devices are needed. Simpler, more trouble-free designs are possible.

Maintenance costs are reduced, with Timken bearings practically eliminating friction. Geometrically designed and precision-manufactured to give *true rolling motion*, Timken bearings meet rigid quality controls every step of the way. We even make our own steel, which no other American bearing maker does. Timken bearings make all kinds of machinery run better, last longer. Look for the trade-mark "Timken" on every bearing. The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".

This symbol on a product means its bearings are the best.



TOWMOTOR CORPORATION mounts the drive axle of its Model 460 lift truck on Timken tapered roller bearings to speed materials handling.

TIMKEN

TRADE-MARK REG. U. S. PAT. OFF.

TAPERED ROLLER BEARINGS

ROLL THE LOAD